In the Realm of the Kob Kings:

Rethinking knowledges and dialogue in a small-scale fishery

…

Gregory L. Duggan

DGGGRE001

A dissertation submitted as fulfilment of the requirements for the award of the degree of Master of Social Science

Department of Social Anthropology

Faculty of Humanities

University of Cape Town

2012

Compulsory Declaration

This work has not been previously submitted in whole, or part form, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works, of other people has been attributed, and has been cited and referenced.

Signature:_____ Date:_____

Contents

Acknowledgements

This research was funded by the South African Research Chair in Marine Ecology and Fisheries (Prof. A. Jarre), itself funded by the Department of Science and Technology (DST) and administered by the National Research Foundation (NRF). Additional funding for the project was granted by the Fishers' Knowledge Project (as part of UCT's Africa Knowledges Project in the Programme for the Enhancement of Research Capacity), and the NRF Sea Change Project.

My thanks also to the Contested Ecologies Project (CE), funded by the Andrew W Mellon Foundation's Sawyer Seminar Programme, and the UCT Africa Knowledges Project (2010-11) funded by the Carnegie Foundation. CE and the project participants have played a significant role in shaping the thinking in this dissertation.

To my co-supervisors, Dr. Lesley Green (Dept. Social Anthropology) and Prof. Astrid Jarre (Marine Research Institute (Ma-Re), Dept. Zoology), my deepest gratitude for your support, guidance and perseverance. Without your insights and energy this work would not have been possible. Prof. Jarre, your passion for research and exploring new ways of working with fishers' knowledges and those of the sciences is inspirational. Thank you for all your unerring personal support. Dr. Green, as always, your tremendous insight into the workings of the world has motivated and challenged me to think about knowledge in new ways.

To Professor Helen Verran, thank you for taking the time to read through an early draft of the thesis. Your support of the research and suggestions challenged me to engage the ethnographic material in ways I otherwise would not have explored.

To Rosemary Ommer and Barbara Neis who took the time to meet with me and inspire the social-ecological component of the research.

My gratitude to David Turnbull whose participation in the 2011 Contested Ecologies workshop and thinking regarding the nature of knowledge have had considerable influenced in this work.

To my graduate research colleagues, Tarrye-Anne Anderson, Kelsey Draper, Sven Ragaller, Jennifer Rogerson, Oliver Schultz and Marieke van Zyl, thank you for the stimulating conversations, the good laughs in times of stress.

Thank you also to Spoonbill, the fisher-scientist. Your insights into fishing and science have proved invaluable in formulating this research and my thinking through the ways in which people relate to fish and the sea. I have thoroughly enjoyed our stimulating conversations.

To my friends and family, to whom I owe so much. Thank you for your unwavering support throughout this work.

Lastly to the stars of the research, the fishers of Stilbaai: 'n Groot dankie vir julle. Sonder julle kennis, vriendelikheid, geduldigheid en insig sou hierdie werk niks gewees het nie. Dankie vir al die tyd wat julle gespandeer het met my. Ek het soveel van julle geleer en ek is dankbaar dat julle gekies het om saam met my te werk. Ek hoop hierdie werk voorspel 'n toekoms van iets spesiaal tussen vissermanne en navorsers in Suid Afrika.

Abstract

Emerging from seven months of ethnographic fieldwork and participant observation conducted in the small-scale commercial handline fishery of Stilbaai, this dissertation examines and rethinks knowledges in a bid to open dialogue between experts (academic researchers, fisheries managers and fishers). The field research for this work was conducted in two intensive ethnographic fieldwork trips of four months and three months respectively between early 2010 and 2011. Stilbaai is home to a small-scale commercial handline fishing industry supporting roughly thirty-five permanent boat crews each comprising between three and eight fishers including the skipper. During my time in Stilbaai I worked with a group of fishers, conducting ethnographic interviews and participant observation (which involved fishing trips to sea and 'hanging out' with the fishers). In this time and also when in Cape Town, I worked with two senior marine scientists from the University of Cape Town and the Department of Environmental Affairs. Adopting an approach to working with knowledge based on a relational ontology I argue, following Turnbull's (2009) and Law's (2004) sentiments, I argue that all knowledge is emergent and performative of particular modes of relating to the world and other beings. As such, I contest notions of homogeneity in knowledge traditions, and the division between society and nature, arguing that the networks, contexts and practices in which people are engaged and the interactions between actors allow them to perceive one another and in so doing bring each other and particular versions of reality into being (Lien & Law, 2010). A relational ontology destabilizes categories of knowledge by showing there to be heterogeneity within. It suggests that actors are given meaning depending on context and their interactions with others. So a person labelled a fisher at sea may be an altogether person (for example a businessman) when haggling prices with the factory buyer on the quayside. Key here are the interactions between actors which surface certain things. By focusing on the practices which result in knowledge claims about the nature of the world I argue that knowledge is a narrative affirmation of a particular reality. Knowledge claims, following Lien and Law (2010: 4) "are productive and help to shape and condition the world". By tracing knowledges then it is possible to explore how knowers relate to others, derive meaning from these interactions and in so doing bring particular accounts of the world into being. In so doing I show that people's ways of relating to the world and other actors demonstrate both convergence and divergence with one another. The strength of this approach, I believe, is its' ability to account for complexity while providing a level playing field in working with knowledges upon which respectful dialogue might be initiated: perceiving all knowledges as emergent, relational assemblages suggests that while a worldview may perform its knowledge as being exclusively able to access and represent universal truth, it is but one of many ways of

relating to the world. With an Ecosystems Approach to Fisheries Management (EAF) slated for implementation by the South African government in 2012, I suggest that the project of rethinking knowledge takes on a renewed urgency. An EAF proposes a radically different approach to conventional stock assessment management, advocating the incorporation of fishers' knowledges into research and management (Sowman, 2011). If an EAF is to succeed, a number of challenges to conventional thinking about knowledge must be made and paradigms pushed to think differently about the relationships not only between knowledgeable experts but between humans and other actors as well.

Introduction

EAF, knowledges and a relational ontology

In an article entitled *The Climate of History* (2009), historian Dipesh Chakrabarty presents the concept of the Anthropocene as a means of thinking through the current state of human history. Described by chemist Paul J. Crutzen and marine scientist Eugene F. Stoermer (in Chakrabarty, 2009: 209) as the "…major and still growing impacts of human activities on the earth and atmosphere, and at all, including global, scales…in geology and ecology" the Anthropocene recognizes humans as a geo-climatic force to rival the current Holocene geological period or even surpass it in our ability to fundamentally alter the physical world. Daily, new warnings and scenarios are made public regarding climate change, pollution, rising sea levels, and threatened food securities to name but a few. Arguably the most visible signs of the Anthropocene are to be found in our oceans: islands of plastic in the Pacific; rising sea levels; oil spills and pipeline leaks and the collapse of significant fish stocks such as Atlantic Cod in Canada are but a few of the more visible examples of the variety of ways in which our rapid alteration of the planet and marine ecosystems manifest. Increasingly there is recognition that the oceanic ecosystems, upon which so much of our diet and global trade and commerce systems are reliant, are threatened or already in processes of degradation.

The growing evidence of stock collapses and associated failures of centralized, quantitatively managed fisheries in many parts of the world have led to a number of calls for alternative approaches to fisheries management which address the concerns of biophysical ecosystems as well as human wellbeing (FAO 1998; Ommer and Team*, 2007;* Neis & Felt, 2000; Maurstad 2000; Zwaneburg *et al* 2000). Recent research (Ommer and Team2007; UNESCO 2007; Murray *et al* 2008; Murray *et al* 2007; Neis *et al* 1999; Neis & Felt (eds) 2000; Stead *et al* 2006; Stanley & Rice 2003) suggests that working with the knowledges of fishers within the fisheries management context offers the possibility of augmenting scientific knowledges by contributing locally-grounded experiential understandings and strategies for dealing with the variability of fish and climate.

In 1992, the Convention on Biological Diversity (CBD) was formulated to address the growing concerns of the time surrounding the preservation and safeguarding of the earth's natural resources. Enshrined in the Convention was a commitment that contracting states "respect, preserve and maintain the knowledge, innovations and practices of indigenous and local

communities" (Haggan *et al* 2007: 21)[1, 2]. In terms of fisheries management the guidelines outlined in the CBD laid the foundations for a significant shift away from established 'top-down' management paradigms, which ignored local people and their concerns, towards more inclusive approaches which worked with local people and ecologies (Haggan *et al* 2007; Erdelen, 2007; Sowman, 2011). One of the more prominent approaches to fisheries management which emerged (and continues to do so) from the guidelines of the Convention is known as an Ecosystems Approach to Fisheries Management, or EAF (Sowman, 2011; Shannon *et al* 2010). A somewhat radical departure from established norms of fisheries management, an EAF adheres to a number of core premises which challenge conventional management structures. One of the guiding principles of an EAF is summed up by Fikret Berkes, who has argued (2011: 9) that "the delineation between social and ecological systems is artificial and arbitrary". An EAF then, seeks to work with complex social-ecological systems and perceives these as engaged in feedback relationships of mutual influence (Berkes. 2011).

In South Africa, although an EAF is slated for implementation by government in 2012, the adoption of an EAF has been slow[3] and complex and the traditional, centralized stock assessment-based structure of management still persists. When the ANC government came to power in 1994, it took over a national fishery with clear symptoms of crisis. Racial, social and economic inequalities characterized the small- and large-scale fisheries at the time. As van Sittert (2002; 2003) writes, the role of capital and big business in shaping fisheries policies, quotas and management objectives had resulted in a set of gross inequalities which privileged a select few. In response to the disproportional representation and distribution of fishing rights and income, the

[1]Whilst the Convention lent explicit support to working respectfully with local knowledges and in so doing made space available to challenge established paradigms of top-down conservation, the language used is that of an identity politics, maintaining a series of boundaries and distinctions between knowledges. The use of the terms 'indigenous' and 'communities' asserts categories of people and knowledges, and the suggestion that contracting parties to the Convention *preserve* 'indigenous' knowledge implies that 'indigenous' people are somehow separate from mainstream society and in need of preservation. The call to maintain these knowledges further reinforces the notion of local people and knowledge as statically situated in a particular node of history which must be preserved for posterity.

[2]Throughout this work I refer to 'knowledges' in the plural. I intentionally use the term to indicate that there exists no singular, homogenous knowledge or reality. Knowledges, I will argue, are inherently a contingent, emergent, multiplicitous, messy and constantly shifting, loose assemblage, sometimes performed so as to appear a concrete, unified whole and legitimate certain authorative claims about the nature of the world. My intention is to demonstrate and allow for knowledges to flow freely and intertwine. In some moments they may converge and in others they might diverge and to attempt to apprehend them via use of the singular is to essentialise and artificially render them static.

[3] An EAF was orginally slated for implementation in 2010 (Shannon *et al*).

government implemented the Marine Living Resources Act in 1998[4]. The Act was overseen by the then Department of Environmental Affairs and Tourism's (DEAT) Marine and Coastal Management (MCM) division[5]. The explicit intention of the MLRA was to redress the inequalities within large- and small-scale fisheries, which had become entrenched through the Apartheid years, through the restructuring of the licensing and quota allocation systems (van Zyl, 2007). Arguably the worst affected by the inequalities of the Apartheid fisheries were small-scale fishers (Sowman, 2011) and the MLRA sought to address these concerns by issuing interim relief permits to those newly identified under the Act as subsistence fishers (van Zyl, 2007).The MLRA's focus on racial and social restructuring in fisheries has been criticized from a number of angles. Van Zyl's (2007) research on the implementation of the MLRA in a small-scale fishing community found that the transformation envisaged by the Act has been severely hampered by an explicit focus on racial categories. As such, argues van Zyl (2007), the inequalities and economic concerns facing fishers have largely remained unattended to, with established capital-intensive companies remaining the dominant force in fishing as a result of entrenched bureaucratic and economic structures, a point reiterated by historian Lance van Sittert's (2002; 2003) research. Van Zyl's (2007) work revealed that in the context in which she conducted her research, there was much contestation of the MLRA legislation and resultant quota and licensing systems. Rather than being included under the new legislation, increasingly fishers found themselves marginalized or prohibited from fishing in places they had traditionally worked for years, for example with the creation of the new Marine Protected Areas (MPA's) formed under the jurisdiction of the MLRA. Similarly, in his research in the West Coast Sardine fishery of St Helena, Oliver Schultz (2010) found a range of misgivings amongst local fishers and fish factory workers concerning the shortcomings of the MLRA in alleviating poverty and unequal distribution of fishing rights and quotas amongst small-scale fishers. Schultz's (2010) findings suggested that inequalities in networks of capital still persisted in this fishery and that the MLRA had had little impact in transferring benefits to local fish workers and fishers. In 2009, Tarryn-Anne Anderson embarked on field research amongst traditional small-scale handline fishers in

[4] For an in-depth investigation of the impacts of the MLRA in a small-scale fishery, see van Zyl (2007) MA dissertation.

[5]In April of 2010, MCM was disaggregated into two departments: the Department of Environmental Affairs (DEA) and the Department of Agriculture, Forestry and Fisheries (DAFF). Although I refer to the new name, DAFF, throughout the thesis, the fishers with whom I worked still referred to MCM in referencing state science and management as the changeover had only recently occurred.

Kalkbay, a harbour located in False Bay on the Cape Peninsula. In Kalk Bay, Anderson's (2009) fieldwork revealed that the MLRA had failed to redistribute fishing rights amongst previously disadvantaged fishers with many who had been fishing for small-scale commercial purposes for years prior to the MLRA denied licenses and quotas, further exacerbating inequalities.

Whilst it sought to shift focus away from the biological and squarely onto the social, by not directly addressing the entrenched big capital interests which dominate the industry the MLRA has brought little change for fishers, particularly those who operate at the small-scale, local level. The failure to fully incorporate ecosystems thinking into the implementation of the Act has further hampered its' credibility (van Zyl, 2007). Whilst the findings of my colleagues suggest that fishers in a range of locations and different scales of fishing continue to experience marginalization under the MLRA, a number of EAF scientists, some from UCT, have been engaged in disputing the conventional approaches to fisheries management over the past few years. Technocratic in nature and driven by a reliance on statistical predictive models the traditional stock assessment paradigm is centrally administered and hierarchical in nature (Finlayson, 1994; Sowman 2011). Local knowledge is largely ignored in favour of quantitative scientific knowledge captured over broad spatial scales. Such management structures place single-species management at the fore and largely ignore both broader ecosystem health and the concerns of local fishers. In this management model, it is assumed that a reactive, biophysical focus and rigorous planning (Sowman 2011) are the most efficient means of successfully managing fisheries.

In response to the growing concerns surrounding climate change and variability and the perceived shortcomings of the MLRA and the failure of conventional top-down, stock assessment-based management paradigms, UCT's Marine Research Institute (Ma-Re) initiated the *Marine Research in the Benguela and Agulhas Systems for supporting Interdisciplinary Climate-Change Science* (BASICS) project in 2010. The approach is interdisciplinary in nature and directly challenges established management protocols by explicitly seeking to investigate an EAF through social-ecological research and collaboration with fishers. Incorporating "physical and ecological modelling studies at a range of scales" as well as complementing these with a broader regional approach (Ma-Re 2010: 1), the BASICS project incorporates perspectives from industry, government, fisheries management and academia as well as case studies working with fishers' knowledges from within the Benguela and Agulhas ecosystems. The objective of this multi-sited, multi-scalar project is to provide understanding of the impacts of climate variability as well as predict future outcomes at various levels including marine ecosystems, individual species and

human coastal communities (Ma-Re, 2010). Since its inception, Ma-Re BASICS has hosted a range of workshops which encourage conversation from all manner of researchers, academics and industry professionals (although fishers have been noticeably absent in these workshops). The focus of the workshops has been on practical aspects of climate variability research in marine commons with the most recent one, for example, covering the question of achieving balance between the objectives of conservation, tourism and fisheries.

Given the context of a failing state marine fisheries management policy, the impending implementation of a coast-wide EAF in 2012, the desire of EAF scientists to work more collaboratively towards effective, context-driven management strategies and the findings of my colleagues on the West and Southern Cape coasts, there is a pressing need to think anthropologically through the ways in which different fishers and scientists perceive one another and narrate their own positions. In order to generate meaningful dialogue, understanding these positions is crucial. Following David Turnbull (2009: 1) I suggest that in order to work with different knowledges in paradigms such as an EAF, it is necessary to "rethink the nature of knowledge". It was out of this context that my research emerged. Jointly supervised from within Social Anthropology and Marine Ecology, the focus of my research was to work with and think through the nature of knowledges and in so doing challenge and push positions, working with fishers and scientists in trying to rethink the dialogue between them.

Why Stilbaai?

In order to attempt such an approach, I required a suitable field site which would itself allow the possibility of dialogue between different ways of relating in the world. In the work of my colleagues it has emerged that many of South Africa's small-scale fisheries are sites of contestation and controversy (van Zyl, 2007; Schultz, 2010; Anderson, 2009). It is of course a given that every fishery is unique, as are the circumstances in which it develops. The small Southern Cape town of Stilbaai, it could be argued, is comparatively less tumultuous than many other sites in the broader South African small-scale commercial fisheries context. Over a period of seven months between 2010 and 2011 I conducted participant observation fieldwork amongst commercial handline fishers in Stilbaai. Located some 350km east of Cape Town, the town plays host to a commercial handline fishery with some 35 to 40 permanent ski-boats. The bay area and surrounds are extensive and the nearest fishery, Gouritz, is some 35km away and home to fewer than 10 permanent commercial skiboats. When I first arrived in Stilbaai, competition for fish was relatively low and my observations and interviews suggested that the past few years had been particularly prosperous for the fishers. When I first began my research in early 2010, all of the

fishers with whom I spoke in Stilbaai had taken significant earnings during the recent period of prodigious Kob[6] prevalence which gave rise to two of the fisher's[7] declaration of Stilbaai as the "Kob Kingdom".

This is not to say the town's residents did not suffer during the 2008 – 2010 recession. The decline in the town's building trade, for example was evidence of a significant economic down-turn but my research revealed a number of pre-conditions and (at least amongst the fishers) adaptive strategies were in place to largely mitigate against economic and other variabilities. Stilbaai is, for the most part, a retirement and holiday town. During December its' numbers swell from roughly four thousand permanent residents to upwards of forty thousand for a three week period when holidaymakers descend. Talking with local Stilbaai residents in my time spent there, a sense emerged that they are accustomed to eleven months of low economic turnover and unemployment did not appear to be an issue – a large retired population supports a small permanent workforce regardless of macro-economic circumstance. In fact the fishers are among the most susceptible to economic fluctuations (in terms of fish prices as a result of currency exchange fluctuations and the laws of supply and demand) and their strategies for dealing with these are dealt with in depth in chapter four. On the whole, however, my observations suggested to me that the area is rather more insulated from economic fluctuations than developed urban areas. While residents of the nearby hamlet of Melkhoutfontein are mostly involved in fishing or the building industry, here too I was surprised to find that the recession had not hit as hard as I had expected. Long-time residents Oom Abel Kleynhans and Oom Tem Michaels told me that this was because the fishing boom had compensated for the downturn in building trade and that

[6]Kob as it is called locally is known to science by the Linnean family *Sciaenidae*s , genera *Argyrosomus*. There are a number of species and sub-species which are discussed in detail in chapter three.

[7] The fishers with whom I worked were mostly skippers who owned their boats. Skippers make the majority of decisions on the boat regarding when, where and how to fish. Many of the skippers are friends and are actively engaged in networks of communication with one another. The majority have worked as crew prior to owning their boats and have years of experience in a range of fisheries and locations. All of the skippers with whom I worked are also fishers in that they work alongside the crew as soon as the boat is anchored. In short whilst crew are no doubt experienced in fishing, skippers of necessity must be acquainted with a range of technologies, techniques and have experience of many species of fish and the conditions in which these may be caught. Moreover, in order to be effective in their chosen profession, skippers must constantly hone their knowledge and adapt to changing circumstances. Their interactive relationships with fish shape their reality. They are the representative face and voice of fishers in terms of dealing with government science and management and are thus vocal about their relationalities. Unless otherwise stated, when I refer to 'fishers' I am referring to the skipper-fishers with whom I worked.

the people of Melkhoutfontein, for decades having lived under difficult economic circumstances, had strategies of their own for dealing with economic hardship. While there are stories of substance abuse in Melkhoutfontein[8] and unemployment is comparatively higher than Stilbaai there was a sense on the part of Melkhoutfontein and Stilbaai residents as well as fishers of calm acceptance of circumstances, and they reminded me a number of times that this was certainly not the first time in the one hundred-odd years of the fishery that times had been tough.

In all Stilbaai and Melkhoutfontein appeared relatively insulated against many of the political and economic events taking place around the country at that time. This could be attributed in part to the fact that the fishing industry is the only significant commercial enterprise in the town and that the fishers' adaptive strategies discussed in chapter four act as a sort of buffer against economic variability. This is not to say, however, that fishers did not take strain during the marked decline in Kob catches which began in the latter half of my research in late 2010 but that the effects of economic and fishing recession were not as devastating as might be expected amongst those whose livelihoods depend upon the sea[9]. As discussed throughout the dissertation, the three to four years leading up to my time in Stilbaai had witnessed larger and larger catches of Kob. When I arrived the fishery was at its height, however towards the end of 2010 the catches began to dwindle rapidly. Fishers expected this as part of a natural cycle of variability but also expected that other fish would enter the bay to replace the Kob, an occurrence which never transpired. Thus the tale is partly one of boom and bust but the stories of adaptability which come out of it lend support to the project of collaborative research advocated in this work. In what follows, I will show that fishers are able to rely on their various networks and adaptive strategies, dynamically developed over time, to cope with adversity as and when it arises. In my time spent in the fishery, many fishers expressed their support for decisions taken by MCM in changing the minimum size regulations for Kob, citing this as one of the principle causes for the prolific Kob catches. The local economic conditions, political stability, adaptive strategies and willingness to work more closely with researchers and managers represent what I believe to be a generally encouraging scenario in which to investigate and carry out a constructive conversation between fishers, scientists and managers. Unlike so many of the

[8] Alcohol was mentioned by skippers on numerous occasions as being a problem amongst many fishers. To a lesser extent, *tik* (methamphetamine) was also mentioned as a growing problem in the Melkhoutfontein area but was not noted amongst the fishers with whom I worked as a problem amongst crew members.

[9] The scope of my research was such that is not possible to speak here about the effects of the economic and fishing recessions on crew members. However I witnessed a number of crew engaging in similar strategies to the skippers during this time, often helping their employers out fixing boats, motors and related parts.

turbulent sites at which my colleagues have conducted research, the comparative calm, political stability, low crime rates and relatively steady income of fishers (at least prior to my entering the field), have contributed to a network of fishers who often voiced their approval of and willingness to work with state management, scientists and researchers in bettering and managing the fishery.

Rethinking knowledges: Social-ecological and EAF in South Africa

The challenge of this dissertation involves these conversations. In order for fishers and researchers to work together it is necessary to rethink knowledges and dialogues: since the inception of South Africa's fisheries management, stock assessment-type management has dominated, marginalizing fishers from important decisions pertaining to their livelihood. With the prospect of a new management paradigm which aims to work with fishers and their knowledges in conjunction with an ecosystem-based natural science, it is necessary to rethink the ways in which knowledges are done before initiating further dialogue or risk implementing any number of problematic scenarios based on particular implicit assumptions. As such, this dissertation builds upon and sometimes challenges, a range of studies. The relative political, social and economic stability of Stilbaai provides an ideal real-world site in which to push paradigms and the willingness of fishers to engage with researchers and managers supports this. In what follows, I provide a brief account of some of the important works and ideas which have informed this project.

Whilst the Convention of Biological Diversity laid the policy foundations in support of social-ecological approaches to natural resource management, recognizing and mandating the importance of working with human concerns in tandem with environmental and ecosystem ones, the EAF which grew out of this had its roots further back in time. From the mid-seventies the work of Robert 'Bob' Johannes in particular began to challenge the assumptions of conventional single-species biological management paradigms. Johannes' critical intervention was the assertion, based on extensive fieldwork amongst fishers in the Pacific, that the knowledges of local fishers were integral in ensuring sustainable fisheries (Johannes & Lamb, 1999; Haggan *et al*, 2007). In this sense, Johannes' work was amongst the earliest to take steps towards working respectfully and meaningfully with local fishers as researchers.

In 2002, South Africa committed to the recommendations of the Johannesburg World Summit on Sustainable Development (WSSD) including the implementation of an EAF in 2010 (Shannon *et al*, 2010). Writing on the challenges and requirements for the effective

implementation of an EAF, Shannon *et al* (2010: 289) suggest that a rigorous "scientific basis" is a vital component in ensuring success in this regard. The authors identified a number of key scientific bases which they suggest may strengthen an EAF. Discussing the food webs - the interconnections and complex relationships between different predator and prey species in an ecosystem and the impacts which fishing has on these - the authors suggest (*ibid.*) that an ecosystem approach provides researchers with a better understanding of the repercussions of fishing both for fishers and fish. Studying food webs and the multispecies connections which take place in these, contend the authors (*ibid.*), is a powerful means of identifying gaps in data concerning the status of fish stocks. Another key base which the authors identify points to the complexities inherent in an ecosystem. Where the role of fishing and the effects of variability of climate are taken into consideration in a model, the authors found that the combined effects of these may result in new dynamics within an ecosystem. In the paper, the authors also identify the key challenges facing the implementation of an EAF in South Africa and provide a range of studies which speak to these. Citing the example of the threatened African penguin population, Shannon *et al* (2010) discuss some of the complexities and difficulties associated with closing down fisheries adjacent to key breeding sites in order to secure sufficient food resources to sustain the penguins' recovery. A range of conflicting objectives and perspectives are at play in this scenario and the authors suggest that the tensions which arise between commercial and conservation agendas in a fishery are an integral issue which an EAF must address if it is to succeed. In this discussion, the authors also identify the challenges posed by trawling on the ecosystem of the sea floor as well as the issues of by-catch and the impacts of different fishing gear on by-catch species such as turtles and sea birds. Suggesting that the complexities identified by an EAF necessitate a structured decision-making framework (Shannon *et al*, 2010: 297), the authors suggest that the use of models and indicators might provide a means of acknowledging complexity whilst structuring it into representative models of the ecosystem in order to make more effective predictions and management decisions. The authors advocate the use of a transdisciplinary approach in order to take into account the myriad social, economic, historical, political and scientific elements which operate within a fishery. Critiquing a 'silo' style of academia in which disciplines are kept largely separate from each other, the authors' suggestion is that collaboration is more suited to working with complexities and thus likely to identify real-world problems and find solutions for these. As such the concluding discussion stresses the need for greater research into the human forces operating in ecosystems, focusing on political, economic, historic, scalar and other issues. The findings of this work suggest that the complexities identified by the authors provide the means of more deeply understanding the

interconnections within ecosystems. Where pressure in the form of human influence is greatest, these may exacerbate extant environmental and ecosystem changes (Odum, 1985 in Shannon *et al,* 2010). Understanding the interplays between these is important in an EAF and in order to undertake this work there is a need for open and inclusive research which can identify and address human and non-human issues and perceive these as interconnected and mutually dependant.

In a (2010) paper entitled *Transdisciplinary co-operation for an Ecosystem Approach to Fisheries*, Paterson *et al* discuss some of the difficulties associated with interdisciplinary collaboration in fisheries management, in this case in the South African sardine fishery. Paterson *et al* suggest that the two most important requirements necessary to facilitate transdisciplinary research are a "common vision" (in this case the creation of an EAF) and a means of involving participants in the project in meaningful interactions with one another. To this end, the authors discuss their development of a Decision Support Tool (DST). This tool is designed to assist fisheries managers in navigating the complexities and difficulties which arise where different knowledges are played out in a fishery context. In this work, the authors chronicle the development of fisheries management and stock assessment in South Africa and provide a discussion on the difficulties and challenges involved in conducting transdisciplinary research. Here the authors suggest that acknowledging differences is an integral step towards working openly and honestly with different knowledges and avoid the pitfalls of miscommunication. Recognizing the variances in methodological approaches of different disciplines, the authors formulated their DST based on a series of focus group meetings conducted from 2007 to 2009 (2010) and noted the importance of participation in the research process. Without a representative participation from all groups caution the authors (*ibid.*), the result of the DST are severely compromised and skewed. There is thus a need to remediate any inequalities and misgivings within different groups and slow down the process of collaboration to allow for these to be worked through. To this end the smaller focus groups served to introduce participants to the DST process, work through any suspicions or concerns before coming together in a larger workshop and generally build rapport between participants (*ibid.*).

One of the commitments of an EAF is to work with a range of scales and perspectives, from large commercial trawling fleets to small-scale subsistence fishers. In a 2011 paper entitled *New perspectives in small-scale fisheries management*, Merle Sowman of UCT's Environmental Evaluation Unit discusses the development of the fisheries management structures which have evolved into the Ecosystems Approaches to Fisheries Management with particular reference to small-scale

fisheries in South Africa. As a result of the pressures and ominous findings of the growing body of research into fisheries management writes Sowman (2011: 297), "worldwide, the past 15-20 years has seen a significant shift in thinking and approaches to the management of small-scale fisheries" resulting in the current EAF framework.

Within the EAF approach, emphasis is placed on working adaptively and proactively with a wide range of perspectives to allow for context-specific programmes of management to emerge. These in turn are intended to incorporate and work with the entire health of an ecosystem and include social and economic concerns as well as human rights (Sowman, 2011). Working with both quantitative and qualitative, anecdotal data derived from local sources is an important component of the working principles of the EAF framework. An EAF is intentionally adaptive and flexible - an approach to management which is driven by a recognition for context-specificity in working with entire ecosystems including human and non-human concerns. Working in such an open way means of necessity taking on complexity and variability as an integral feature. In so doing, an EAF seeks to work with both convergences *and* divergences of knowledge as well as recognizing the messy, complex networks and flows which comprise ecosystems. Working with these complexities is difficult and as yet, the majority of fisheries managers continue to struggle to adapt to the new protocols outlined out by an EAF (Sowman 2011).

Coasts Under Stress: Restructuring and social-ecological health

Much of the current global thinking where an EAF is concerned stems from the work of the Coasts Under Stress (CUS) Project. When the commercial Cod fisheries on both the East and West coasts of Canada collapsed in the early 1990's, historian and geographer Rosemary Ommer and colleagues including sociologist Barbara Neis embarked on an innovative transdisciplinary project of research and investigation which covered two coasts and multiple fisheries. In formulating their research agendas, the CUS team recognized that "the fundamental problem is an inadequate understanding of the highly complex links between social and environmental restructuring and how they interact with the health of people and places" (2007: 3-4). In the case of the Canadian Cod fishery collapses, the Coasts Under Stress team (Ommer and Team, 2007) found that a past failure to account for the complexities of the interconnected human and ecological realms were an oversight which failed to perceive how rapidly Cod stocks were dwindling. The authors refer to various forms of what they term 'restructuring' – a complex of changes in circumstance which if left unaddressed may lead to dire consequences for the system in question. Two examples provided are environmental restructuring, for example changes in

climatic systems; and social restructuring which includes (but is not limited to) changes in industry, policy regulations and technology (*ibid.*). Restructuring most often occurs as a complex of factors operating at a range of scales and is thus difficult to predict and work with. The authors recognise (*ibid.*) that a series of restructuring events took place along the Canadian coastline leading up to the collapse of the Cod fishery. Taking a historical view, Ommer and Team (2007) suggest that the process of restructuring has been occurring throughout history and has been compounded by the mutual influence of humans and environment. The authors found that the failure of traditional stock assessment models to account for restructuring and the interplay between humans and ecologies had severely compromised the ability of management to adapt to recent restructuring (*ibid.*). Given the inability to account for anthropocentric (such as increased fishing pressures) and climatic effects in the system and the effects of stock collapses on human populations, the stock assessment system in Canada failed both the fishers and the fish (*ibid*). Ommer and Team's (2007: 4) response to the situation has been to adopt a social-ecological approach which recognizes that "today's coastal communities are the product of centuries of *interactive* restructuring between people and natural environments". When restructuring takes place, following the authors (*ibid.*), the impacts of this are exacerbated if "risks, costs and benefits are misaligned". Adopting a social-ecological focus, the researchers pushed the paradigm further by including considerations of human health and history in their research. In this way, the CUS team introduced an approach to dealing with complexity which linked the health of people with restructuring changes in social and natural environments. The team was thus able to show how changes in any part of the interlinked system affected the health of another, a powerful means of integrating concerns and working with these as interconnected. The authors assert that in order to recover from the devastating and still unfolding socio-economic and ecological impacts of the Cod fish collapse, there is a need to understand what happened and what continues to emerge, and the reasons for these.

One of the most critically important interventions to emerge from this work was the recognition of what the authors see as a fundamental series of mismatches of scale which include spatial, temporal and organizational scale asymmetries. Requiring an approach to working with the complexities at play in these varying coastal contexts, the CUS team developed what they refer to as a 'social-ecological health' approach, "a new comprehensive analytical framework for understanding social and ecological restructuring and its impacts on health…" (Ommer and Team 2007). Within this framework, the team found that working with local people and transdisciplinary researchers collaboratively, opens the possibilities for understanding and working through the complexities and multi-scalar challenges which take place in social-

ecological systems. The findings of Ommer and team (2007) suggested that most often, rural development strategies focusing on economic growth are insufficiently linked to environmental stewardship objectives. As such, the team argued (2007) that there is need to extend the working ties of inter- or transdisciplinary and local collaborations to include the integration of different economic sectors and government agencies. The involvement of these, suggest the team, are integrally linked to the potential success of locally-lead management programs in that these secure funding, institutional, regulatory and administrative support which are otherwise lacking in many rural fishing communities. The team thus concluded that future research explore the links between "regional economic development, integrated management, and resource management" (2007: 427) in a bid to balance the diversification of local economies with environmental and social concerns.

Another critical intervention to emerge from the CUS project was the development not only of new knowledges and ways of understanding and conducting research but techniques for making and moving knowledge both within research teams as well on to policy makers and local communities. The work of the CUS project has revealed the extent to which the collapse of economically-significant fish populations have far-reaching impacts beyond simple economics. Where communities are integrally linked to fish in a relationship of dependence, restructuring of climate, ecosystems, regulations, networks of trade and capital as well as technologies and associated industries have created the preconditions in which changes at one level of the system may have profound and often unforeseeable knock-on effects in terms of the human, economic, and ecological health of a place, people and species.

Making and Moving Knowledge: Interdisciplinary and Community-based Research in a World on the Edge

Building on the work of CUS and a number of other projects, Sutton Lutz and Neis' (eds) 2008 *Making and Moving Knowledge* examines in great detail, the ways in which different knowledges emerge and how these might be worked with in different contexts. The volume addresses questions around the distinction between information and knowledge and the ability to work wisely with the latter (2008). Acknowledging that scientific knowledge is limited in its scope when dealing with marine social-ecological communities, the volume covers a range of knowledge-based topics and conversations. Of particular interest to my work is Murray *et al*'s chapter concerning the challenges of working with seemingly incommensurable knowledges: where the knowledges and practices of fishers and fisheries scientists are brought into conversation, these are often based on divergent approaches, methodologies, scales and

experiences (Murray *et al*, 2008). In the context of conducting social-ecological research which works with these different knowledges and practices it is vital that researchers refine tools for comparing and working with these without maintaining hierarchies of knowledge. To this end, Murray *et al* (*ibid.*) develop a historically-based social-ecological analytic which combines historical information and knowledge from a range of sources. The strength of this social-ecological history approach, argue the authors (*ibid.*) is that it allows researchers to reflect on the development of the fishery and, critically, overcomes the "shifting baseline syndrome" (Pauly, 1995 in Murray *et al*, 2008: 101) in which experts relate current observations of fish population numbers only as far back as their experience thereof since entering the fishery (as opposed to a deeper history of that fish population which might have been far higher).

In concluding this work, Neis and Sutton Lutz (2008) identify two themes which emerge in the various essays: community and the need to recognize and work with issues which transcend these. In other words, whilst the notion of community is a theme of great importance identified by the various authors, researchers and research participants in this volume, there is a coterminous sense of the need to work beyond and between communities if collaborative research is to work meaningfully with knowledges. The authors argue (*ibid.*) that disciplinary identity and scope constrains the ability of researchers to fully account for and represent interactions between different communities of knowledge. The result of this, argue Neis and Sutton Lutz (2008: 272) are a series of shortcomings in research and policy formulation which are only partially aware of circumstance and fail to fully appreciate and work with the dynamics and complexities of a given context. The suggestion is that future works engage in more interdisciplinary-oriented research which seeks to cut across boundaries in order to work with complexity and differences.

World Fisheries: A Social-Ecological Analysis

Taking as its' focal point a social-ecological perspective (Ommer & Perry, 2011), this work seeks to move the debates in fisheries research and management forward. Divided into six parts, the book covers a range of conceptual shifts, approaches and research contexts. These collective works actively engage with and challenge conventional thinking around marine systems by presenting a range of complexities and suggesting various means of working with these. Stemming from the opening chapter by Fikret Berkes, a common thread emerges from the research presented in this book: that of "the crucial interdependence and interconnectedness of the ecological and the social in global marine fisheries" (Ommer & Perry, 2011: 403). In their conclusion to the volume, Ommer and Perry (*ibid.*) argue that the challenge of acknowledging

the interconnectedness of social and ecological worlds is that such recognitions directly challenge assumptions of established fisheries management paradigms. Of necessity, argue the authors (*ibid.*) is the need to conduct research at a range of scales and as such, working with small-scale fisheries is vital as these can provide a detailed account of localized trends within social-ecological systems. Moreover, where these are compared with broader international trends, a more nuanced understanding of systemic variances and challenges may be generated. In order to conduct such multi-scalar research, contend Ommer & Perry (*ibid.*) the works in the *World Fisheries* series present (and suggest the continued need for) interdisciplinary research which seeks to work in new ways with fishers and fish. Indeed Ommer & Perry suggest (2011: 404) that "the interdisciplinary nature of the work is leading edge and can and should set the agenda for the next five years of fisheries analysis and governance thinking". One of the notable findings of this work is that there exist considerable gaps in the knowledges of social-ecological systems.

Discussing the formulation of appropriate strategies in dealing with the pressures of climate change and other issues facing North America's traditional fishing communities, Grant Murray (2011) (in this volume) argues that in order to plan for and mitigate against change, it is essential that planners understand the complex, emergent social-ecologic interconnections which influence and aggravate these pressures. Key to this argues Murray (*ibid.*) is an understanding of the particular values of a group in order to work with these in the creation of apposite responses to external and internal pressures. Critical to my own work is Murray's (2011) assertion that the complex values revealed by a social-ecological approach to research suggest that conventional economic investigations such as an ecosystems services approach are not able to identify or work with these values in appropriate or sufficient ways. Furthermore, argues Murray (*ibid.*), ecosystems services approaches, in their inability to account for the interrelated effects of social-ecological function, are liable to focus solely on quantitative data and ignore the qualitative relationships and the impacts of these on the fishery under investigation. Murray's findings suggest that many fishers in the North American fisheries operate from positions somewhat disconnected from the fishery and their community due to the influence of capital and corporatization. While these do not correlate with my research findings, Murray's (*ibid.*) suggestion that fishers and fisheries have altered significantly in their technology, spending, equipment and approaches to fish and fishing echo somewhat with my findings. The past decade has seen a rapid uptake of technology in Stilbaai according to the fishers. Today almost all of the craft sport GPS, Sonar fish finders, VhF radios and Vessel Monitoring Systems (VMS) with fishers employing cellphones and internet weather forecasting sites to keep themselves updated. Murray's (*ibid.*) discussion of the effects of climate change is also somewhat pertinent to my

research site: while the fishers did not identify climate change as an important factor in the fishery, they did remark that what they perceived as climate variability was of particular interest and identified a range of factors such as wind patterns, water temperatures, which they saw as playing a role in fish behaviour and movements. Murray suggests (*ibid.*) that as a result of the uncertainty surrounding the effects of climate change on local ecologies, management strategies designed to cope with these should of essence be flexible and adaptive. This work has been influential in my thinking through the interconnectedness of fishers and the marine ecosystem as well limitations of conventional management and evaluation paradigms as well as the scope which emergent alternatives will have to encompass. Moreover, Murray's argument concerning the formulation of appropriate responses to the challenges of shifting context resonates with the increase in variability I observed in Stilbaai, as discussed in chapters two and four.

Writing in this same volume on the subject of social-ecological knowledge, Barbara Neis (2011) takes as her focus a broader scale than Murray, addressing changes in the global marine system. In this chapter, Neis (*ibid.*) suggests that there is dire need for knowledge which will enable researchers to both monitor change, as well as prepare for and act according to future scenarios as they unfold. Discussing the characteristics of local and scientific knowledge respectively, Neis (*ibid.*), drawing on Berkes (2008; Berkes *et al,* 2003) suggests that all knowledge is contextually developed within places and is transformed as it is transferred between different networks. In this discussion, Neis explores some of the challenges of working with social-ecological knowledge and hence the knowledges of fishers and scientists particularly where collaboration is sought. Noting a number of divergences in perspectives, Neis (2011: 187) notes that heterogeneity is common to the networks and knowledges of scientists, fishers and managers with significant "sub-networks" often diverging in their relational engagements from the perceived bounded discipline in which they operate. Neis (*ibid.*) cautions that the growing trend in fisheries management away from reliance on stock assessment towards co-management structures may result in a politicization of the terrain, whereby scientists begin to feel disenfranchised as fishers become increasingly relied upon to inform the focus of management meetings and decisions. Key here, following Neis (2011: 187) is "the need for reflexivity and the potential for disagreement and miscommunication".

Whilst the work of the Canadian EAF scholars in particular has made inroads into the challenges of working with a social-ecological outlook, in South Africa a growing body of work has emerged over the past decade which addresses local issues, particularly where the rights of fishers are concerned. Environmental historian Lance van Sittert has written much on the history

and life histories of fishing and fishers in South Africa, suggesting (2003) that the stock assessment science-centered foundation of contemporary fisheries management in South Africa has lead to constraints in the ways in which the knowledges of fishers are most often worked with, such that they remain marginalized and largely unheard (2003). Discussing the reformation of the South African commercial fishery during the 1990's, van Sittert has suggested that a focus on Apartheid limits the scope of reform. Van Sittert has argued that it is capitalism and not racism, which is a root cause of the inequalities which beset the South African commercial fisheries sector. Van Sittert (2002: 295) argues that the current government's focus on Apartheid as a primarily racist legacy is "a blunt analytical tool" which, far from enacting true reform in the fisheries sector, has served to perpetuate a similar set of practices to that of the Apartheid system in which the role of capital and class inequalities are largely ignored.

The result of this, argues van Sittert (2002), is that established large corporate fishing companies continue to prosper whilst the predicament of small-scale fishers remains largely unresolved. In order to properly redress the inequalities of the past as well as the current system, argues van Sittert (2003) it is essential that one take into account more complete histories which include networks of capital and class in their analysis. Van Sittert's call for an acknowledgement of history in theorizing and working with fisheries has been influential in my writing and I have found his suggestions invaluable in formulating the first chapter of this dissertation, leading me to focus on an archeological, socio-ecological and economic history of Stilbaai and Melkhoutfontein as a means of setting the scene and contextualizing the current series of events as they unfold.

PLAAS

Like Van Sittert, Moeniba Isaacs, Mafaniso Hara and their colleagues in the Programme For Land And Agrarian Studies (PLAAS) at the University of the Western Cape (UWC) have focused their research into fisheries on predominantly social aspects. Their work has found that where reform of economic, social and racial inequalities has been mandated in established large fishing companies, this has been largely "cosmetic" (Isaacs *et al* 2007). Isaacs *et al* (2005: 2) found that whilst "the responsibility of the state through MCM is to ensure that the equity and redistribution are achieved without endangering the economic stability of the resource", a number of institutional and bureaucratic structures had conspired to slow down or avert the process of transformation with additional alliances between big business and trade unions serving to curtail government's drive to reallocate quotas to previously disadvantaged, small-scale fishing communities. In a 2009 article, Hara & Raakjaer, drawing on an actor-orientated analysis,

found that established power and resource bases severely limited the ability of new entrants into the fisheries sector to succeed. Isaacs *et al's* (2005) work found a distinct lack of fisher involvement in co-management, with the authors suggesting that no clear definition of the term (co-management) has been formulated. Isaacs *et al's* (2007) work found that one of the biggest hurdles to the redistribution of wealth in alleviating poverty in small-scale fisheries is a lack of government accountability coupled with a focus on managing fish stocks rather than actively addressing socio-economic concerns. Where people remain disenfranchised and marginalised, argue Isaacs *et al* (2005) intervention by government is required both in emerging small enterprises as well as in larger established companies. If true reform of the inequalities which continue today is to take place, the imperative lies with the state to act swiftly and vigorously "providing access to capital business and management skills…and setting up a watchdog to monitor real progress towards transformation" (2005: 1).[10] It is clear from the work of PLAAS that a number of entrenched bureaucratic, power and economic structures exert a great deal of influence in South Africa's fisheries, with small-scale fishers arguably the worst affected. As such, the PLAAS team's findings have been helpful in my understanding of the Stilbaai fishers' positioning with regards to these structures.

Masifundise (www.masifundise.org.za)

The findings of the PLAAS team have suggested strongly that there is dire need for support for fishers at both local and government levels. Masifundise is a non-governmental organization which seeks to uphold and push for the rights of fishers, particularly where debates around rights to access and knowledge are concerned. Having involved itself directly in representing two separate court cases in which fishers rights were jeopardized, Masifundise has positioned itself as a voice in support of disenfranchised fishing communities.

[10]Another central concern of the PLAAS team's work is the impact of HIV/AIDS on South Africa's small-scale commercial fishing communities. In 2008, Isaacs and Hara released a comprehensive study detailing the findings of research into HIV/AIDS impacts in four fishing communities along the South African coastline. The study, commissioned by the then Department of Environmental Affairs and Tourism's Marine and Coastal Management (DEAT: MCM) branch was intended to identify the socio-economic impacts of HIV/AIDS amongst fishing communities and find ways of mainstreaming the findings into fisheries policy. Amongst a wide array of findings, Isaacs and Hara noted that the impact of HIV/AIDS is widespread and dire in many fishing communities but that little is known about the extent of infection. Stereotypes and associated marginalization of infected individuals, particularly women were prevalent in their research sites. Their findings prompted a number of suggestions including the need to create a grant to assist those fishers who are HIV/AIDS positive and involve communities in supporting HIV/AIDS positive people.

Research of colleagues

My research is part of the Ma-Re BASICS and Fishers Knowledge Projects. The Fishers Knowledge Project is a collaborative interdisciplinary and multi-sited research project funded by PERC as part of the University of Cape Town's project for rethinking the place of African knowledges in research projects. Bringing the objectives of Ma-Re BASICS and the Fishers Knowledge Project together, Prof. Jarre (Ma-Re) and Dr. Green (Social Anthropology) have co-supervised a number of social anthropology theses focusing on fisheries and fishers knowledges in a range of fisheries along Benguela current ecosystem coastline. Starting in 2007, Marieke van Zyl began her research amongst small-scale handline fishers in the Southern Cape town of Kassiesbaai where the impacts of the MLRA were felt particularly keenly. van Zyl took as her focus the ways in which the implementation of the MLRA affected the wellbeing and economic stability of the Kassiesbaai fishers and their families. The site was highly contested and van Zyl's focus on discursive differences revealed the divergent and often disconcerting ways in which the MLRA was enacted by local fishers, government officials, MCM fishery managers and marine fisheries experts. Van Zyl's work concluded that the relative failure of the MLRA in this fishery was due to an inherent lack of trust between these groups, fostered in large by the divergent ways in which people perceive, talk about and enact their versions of fish, fishing, fishers and the sea.

Following on from van Zyl's work, 2009 saw Jennifer Rogerson and Tarryn-Anne Anderson conducting field research in Simonstown and Kalk Bay respectively, both working with small-scale fishers. In 2010 the group expanded further when Rogerson and Anderson, returning to conduct masters fieldwork (Anderson returning to Kalkbay and Rogerson now electing to work with small-scale handline fishers in Lambert's Bay on the West Coast), were joined by Sven Ragaller and myself at two new sites in the Southern Cape: Gansbaai and Stilbaai respectively.

Rogerson's 2010 work in Lambert's Bay took as its focus the ways in which different groups perceive and interact with the sea. Rogerson's work took as its' focus the ways in which different people assemble and enact different versions of the marine environment and in so doing, a strong sense emerged of the embodied ways in which fishers come to know the sea. In her work, Rogerson suggested that, somewhat paradoxically, the science which informs state-regulated fisheries policies such as the MLRA often leads to 'epistemological policing' of local fishers, disenfranchising them from the very seas they have fished for generations. Rogerson's study found that the fishers with whom she worked related to fish as more than objects for capture,

suggesting a relational ontology in which fishers and fish acted as engaged subjects rather than the subject (human) - object (fish) distinction which forms the conceptual basis of a modernist nature-culture dualism.

Taking as her entry point, the logbooks which skippers use to keep track of catches and items of interest in the fishery, Anderson's 2010 work sought to further develop her 2009 honours thesis. Logbooks were central in Anderson's research through their use as devices for transforming and transferring knowledge between fishers and fisheries researchers. Anderson's focus on logbooks and the process of what she refers to as 'tracking the movements of fish' were instrumental in her research, a gateway into understanding how fishers go about making and sharing knowledge.

Ragaller's 2010 research was conducted amongst commercial fishers in Gansbaai who engage in both handlining and trawling. Dyer Island in the bay is a highly contested space and home to a threatened penguin colony. Recent moves by fisheries managers and scientists to close the waters adjacent to the island in order to protect food supplies for the embattled penguins have lead to a series of disconcertments and moments of knowledge tension between them and the local fishers who feel their fishing grounds are being threatened and removed to their detriment.

With the proliferation of research sites along the West and Southern Cape coasts of South Africa, Draper's 2010 work in the Namibian commercial trawling industry expanded the research further in terms of spatial and economic scales. Taking as her focus the networks of technology, knowledge and capital at play in a fishery, Draper's work explored the possibilities of formulating a political ecology centred on the Walvis Bay hake fishery. Through this approach, the research found that tracing networks of knowledge is a vital process in understanding context and formulating meaningful policy accordingly[11].

Earlier I suggested that in the emerging context of South Africa's fisheries it is necessary to rethink knowledges and dialogues. The overarching theme common to all of the fisheries and the research findings discussed above is one of contestation and disenfranchisement. A sense emerges in the South African studies and the work of PLAAS, van Sittert and my colleagues in Social Anthropology that the MLRA and conventional management approaches have fallen short of their goals. Fish stocks are in crisis and there has been little done to successfully redress the

[11]Draper's research was co-supervised by Barbara Paterson, a post-doctoral researcher in the Fishers Knowledge Project, associated with Ma-Re and based in Namibia. Paterson's work on the Namibian pelagic trawling industry has focused on the human dimension. With a background in philosophy and computer science, Paterson's development of decision support tools have sought to incorporate human dimension indicators into the fisheries management process.

injustices and inequalities of the Apartheid era. Given the current circumstances in which South Africa's fisheries, fish and fishers find themselves there is still much work to be done in resolving issues of social, ecological and economic inequality, marginalization and trust building. In addressing these issues there has been a tendency in recent social science research of South Africa's small-scale fisheries to focus identity politics. Where an identity politics of race, social justice and community health come to frame conversations, people are often marked as belonging to and representing one or another distinct identity group. The shortcoming of such a focus, following van Sittert (2002) is that an identity politics of necessity relies on identifying discrete groups of people engaged in a political struggle. In other words, this perspective assumes the naturalness of racial and social categories and thus places emphasis on social explanations for observed phenomena. In so doing, there is a tendency to narrow the frame of enquiry, thereby downplaying the complex circumstances playing out in a given situation (for example the role of capital and political maneuvering). An identity politics then, establishes a sense of 'us versus them' in working with fishers and fisheries management based around tightly policed social constructions of identity. Such an approach makes communication between groups difficult since the language of an identity politics, especially one grounded in race, is one of conflict and oppression and thus of hierarchies of knowledge and power.

In addressing the critiques of identity politics, van Sittert's work employs a political economy analytic to fisheries management that takes race as its focus. Whilst this move somewhat restores a degree of complexity to the picture, it remains limited in its scope. A political economy approach is certainly useful in understanding the power dynamics and role of capital in fisheries but its gaze is focused on these. Such a perspective relies on distinctions between discretely defined groups and knowledge positions. An identity politics and political economy, while taking steps to include the lived experiences and voices of people in the account, remain limited in their ability to work with knowledges due to a reliance on social explanation and discrete notions of identity and belonging. A focus on social explanations relies upon and maintains a binary separation between the perceived realms of nature and culture because to assume the existence of a discrete realm of 'social' by implication assumes a 'non-social' realm (i.e. nature) (Viveiros de Castro, 2004).Such distinctions fail to account for the interplay and overlaps that society and nature share in their coexistence and co-creation of one another, leading Viveiros de Castro (2004: 481) to suggest that "it is impossible to rethink the social without rethinking the natural".

The intellectual heritage of the sciences is such that they have come to occupy a privileged position in state management of natural resources[12]. An EAF science seeks to redress this by advocating that participants work to incorporate the knowledges of fishers into research and a broader management strategy (Dengbol, 2003; Wilson *et al, 2006;* Sowman, 2011). The associated risk of this is that locally-derived knowledge might be lost in translation, silenced and removed from its locality, thereby losing the source of its inherent value and legitimacy. Projects such as Coasts Under Stress have attempted to address these and other perspectival and methodological concerns by employing a social-ecological approach. Such an approach to research pushes paradigms by requiring that researchers, government officials, local people and managers all recognize the interconnections between humans and non-humans. However, in so doing there remains an underlying assumption which maintains a degree of separation between knowledges and beings. By adhering to categorizations of knowledge such as fishers' and scientists' the approach hits a stumbling block: the distinctions suggest hard, fixed boundaries between knowledges, worlds (social and natural) and practices. Whilst there is talk of the interconnectedness of these discreet worlds they remain as such with defined membership and characteristics.

Nature-cultures and contested ecologies

The theoretical background of this research is informed by recent trends in social science research which have begun to shift the focus of knowledge studies debates onto the ways in which knowledge emerges. Taking a cue from the sociology of scientific knowledge (SSK) and science and technology studies (STS), researchers and theorists such as Latour (1999; 2004a; 2004b), Stengers (2005; 2008), Turnbull (2000; 2009), Law (2004), Lien and Law (2010), Verran (2001; 2011 forthcoming) and Viveiros de Castro (1998; 2004) have begun to rethink the ways in which knowledges are constituted by examining the networks and practices in which these emerge. It is my belief, emanating from the experiences of my fieldwork and the work of the theorists mentioned above, that knowledges and knowers do not fit neatly into, nor work within the bounded, discrete categories in which they are said to operate in.

In this thesis I examine a number of knowledge claims and ways of relating to the world and other actors[13]. Developing a relational ontology I draw on a performative analytic proposed by

[12] This point is developed further in chapter three.

[13] I draw on the term 'actor' in this work as described by Latour (1984). The term pertains to all things, living and inanimate. It posits all entities as equal and no more real or powerful than one

Lien and Law (2010) in order to investigate a range of knowledge claims and ways of relating to the world. Knowledge, I argue, is a multiplicitous, messy process (Law, 2004), which does not represent truth, fact or the world "as it is" but rather is generative of a particular account of nature[14] based on interactions with others conducted via emergent assumptions about what exists in the world.

The challenge of this dissertation then, and the goal it sets out to achieve, is an alternate means of talking about and working with different ways of knowing and relating to the world and other actors. Working with differences and convergences whilst not binding one or another position to a finite category is a great challenge but one I believe is necessary if relationalities are to work respectfully with one another in managing fisheries. With research and projects such as *Coasts Under Stress*, Ma-Re BASICS, *World Fisheries* and *Making and Moving Knowledge* advocating interdisciplinary approaches to research and management which seek to include fishers in their objectives and the associated difficulties and teething problems identified in these new approaches, there is a pressing need to conduct more symmetrical research which challenges assumptions and posits new possibilities for working with knowledges. To this end I believe the relational ontology proposed in this dissertation pushes research to move beyond anthropocentric constructivist or relativist explanations of the world and concern itself rather with the ways in which actors see, relate to and bring one another into being.

Recent works by Latin American scholars in particular, have pushed the knowledge debates further, with the work of Viveiros de Castro (1998; 2004), Blaser (2009; 2010), De la Cadena (2010) and Escobar (1999; 2008) providing insight into accounts of nature which posit different relations between humans and no-human beings. In their various works, these authors challenge various assumptions of modernism, for example that culture and knowledge are distinctly human traits and nature the sole realm of animals (Viveiros de Castro, 1998). In so doing, these authors have begun to furnish the discourse and thinking about knowledge with the language and tools to think, speak and work with different ways of interacting in the world. Rather than explaining away knowledge as 'belief', these emergent approaches concern themselves with the locus of praxis.

---

another. As such it undoes the distinction between natural-social, subject-object (Harman, 2009). For a full description of the term see Latour's *Irreductions* (1984).

[14] The term 'account of nature' is not a distinction between nature and culture but rather refers to an account of the nature of the world including culture and the possibilities of existence.

The intellectual project of this dissertation could loosely be termed a 'natures cultures' approach to knowledge, which does without the social as the overarching category of analysis. I am not so much concerned with what people say about themselves and their work as how they interact with others and in so doing bring their account of reality into being. Sometimes relationalities show marked convergences whilst at other times they diverge considerably and the chapters reflect this. My aim is not to provide solutions but suggestions via an exploration of knowledges and relationalities. For an EAF approach to succeed, it must be pushed further to question its own intellectual, practical and relational roots. This dissertation presents a number of relational engagements with fish, fishing and the marine ecosystem of Stilbaai in the context of potential variability, a research question key to the Ma-Re BASICS project. In so doing, I challenge an EAF and suggest potential steps that might move it beyond working with purely social categories and explanations of knowledge.

Chapter outline

Chapter one introduces the historical context and development of the Stilbaai fishery. Starting in the Blombos Cave archeological site I walk the history of the coastline in the footsteps of the early coastal dwellers of the area, coming to the stone fish traps of several millennia past which remain today in largely unchanged form. There is no written history of the Melkhoutfontein and Stilbaai area available until the early 1800s when the area of Melkhoutfontein was settled. However, the fish traps serve as a node linking the past to present, evidenced in the small fishing collectives which originated amongst the 1800s settlers as means of working the traps for subsistence purposes and which continue today amongst some of their descendants who fish commercially. Discussing the development of Stilbaai and Melkhoutfontein I take time to introduce the fishers who call these areas home and who critically informed my work.

It is often assumed that fishers are incapable of or at best do not engage in thinking about large spatial, ecosystemic or temporal scales. Taking as an example the need for more detailed water temperature analysis along the Benguela Current coastal ecosystem, chapter two demonstrates a number of convergences between the observations and anecdotal data of fishers and those of marine science. In this chapter I challenge bounded notions of knowledge, introducing fishers who conduct research and researchers who fish.

In chapter three, drawing on ethnographic interviews, observations and official texts from MCM/DAFF I present two enactments of the fish Kob. In discussing these different ways of relating to and interacting with fish, I draw on the work of, amongst others, Law (2004), Lien

and Law (2010) and Mol (2002) exploring the ways in which the messy complexity of knowledge is often left out of the narrative account in the interest of simplifying the account of reality in order to communicate it to others. Lien and Law's (2010) performative approach in particular is useful in working with a relational ontology in that it allows one to trace the associations and ways in which a particular relational engagement brings itself and others into being. In the final discussion I address a moment of disconcertment. Drawing on the work of Verran (2011 forthcoming) and Whatmore (2009) I suggest that rather than presenting a stumbling block to communication, disconcertments might be embraced as generative events (Whatmore, 2009), moments in which different relationalities are able to open and engage in meaningful dialogue.

The fourth and final chapter presents a relationality – an ethics which emerges from a particular relational engagement, in this case between fishers and fish. This relationality is as much about the self as it is about others – it is through the interactions with fish that the fishers find meaning and a particular ethical position emerges. I give voice to the fishers presenting the ethics, ecology and environmentality which attend this adaptive, emergent relationality. The chapter suggests a clotting (Verran, 2001) of concerns in which the desire to make money, maintain job security, work ethically with an ecosystem and ensure a future for the next generation of fishers are placed in dialogue. I discuss a range of strategies which I witnessed during the time of Kob decline and suggest that these emerge from adaptive capacity of fishers to work with the potential which emerges with circumstance (Jullien, 2004), an approach to life which they also draw upon when interacting with fish at sea. Far from seeking to romanticize the lives or knowledge of these fishers, this final chapter sets out to show that it is practically possible to work ethically with fish, the sea and fellow fishers whilst seeking to generate income. The ecology and ethics which attend this relationality, which concerns itself with well-being and "thinking like a fish" I argue, is a key component in the success of these fishers and their ability to adapt to changing conditions both within and outside of the fishery.

Chapter One

Histories: Of caves, traps, people and fish

> *"Anamnesis* means remembrance or reminiscence, the collection and re-collection of what has been lost, forgotten or effaced. It is therefore a matter of the very old, of what has made us who we are. But *anamnesis* is also a work that transforms its subject, always producing something new. To recollect the old, to produce the new: this is the task of *Anamnesis*"
>
> (Harman, G 2009: i emphasis in original)

> "Places do not have locations but histories. Bound together by the itineries of their inhabitants, places exist not in space but as nodes in a matrix of movement"
>
> (Ingold, 2000: 219)

The task of anamnesis is the starting point of this chapter and indeed of the thesis: in order to challenge assumptions, rethink ways of being and interacting in the world, it is important to recollect the old, to know where we have come from. In the present chapter, I introduce a history of Stilbaai and surrounds. Beginning the story in pre-history, I trace the genesis of fishing and the interactions between humans and fish in the area. Later in the story I chronicle the settling and development of the area in the 1800's and on to the present day. Finally, I introduce the fishers with whom I worked during my field research.

Long before Homo erectus walked the African plains, before the first invertebrates crawled from the oceans to continue the evolutionary processes which would result in the diversification of mammals, reptiles and insects, life thrived in the oceans. There was a time that early humans survived along the coastline of what is today known as the Southern Cape region of South Africa's Western Cape Province. In cases where archeologically-significant data has been collected, Middle Stone-Age (a period beginning 250 000 years ago and ending some 22 000 years ago) industries are named after the locality. Throughout South Africa, a number of Middle Stone-Age sites have been identified including the 'Still Bay industry' (Stoffberg, D. 1998. 23) and in particular the Blomboscave near Stilbaai is today synonymous with the Middle Stone-Age and the Still Bay industry as archaeologists continue to unearth implements, beads and other

artifacts from the Later- and Middle Stone-Age periods, indicative of a long history of settlement and subsistence along the coastline in this area.

Blombos Cave

In late April of 2010 I had the opportunity to visit the famed cave with archaeologist and discoverer of the site, Prof. Chris Henshilwood of the Centre for Development Studies at the University of Bergen, Norway and head of the African Heritage Research Institute in Cape Town. He currently holds the position of director of the Blombos Cave Project, affording him roughly three months every year to visit the cave, bringing with him students and mountains of equipment.

The cave itself is no more than a deep overhang, located about 30m above and away from the rocky shoreline. Fresh water flows abundantly from a nearby '*oog*' (eye) in the adjacent cliff face, the cave entrance barred to unwanted visitors by a wall of barbed wire secured with padlocks. After opening the entrance and starting the small petrol-powered generator which powers various lights and tools Prof. Henshilwood invites me to descend into the roughly 2m deep hole meticulously carved out of the cave floor. A short wooden ladder is secured towards the back of the hole and I climb down, seating myself as comfortably as possible at the bottom of the hole whilst being mindful not to touch any of the delicate walls – no more than compacted sand which the lightest pressure can dislodge or crumble. Literally thousands of pins dot the side of the hole, each with an individual note attached describing a particular period of inhabitance or where an artifact was located and removed. Some of the layers have sagged or appear to have melted into each other but some are quite clear and signs of charred ashes remain in some sections, showing the remnants of ancient camp fires or shell middens.

Prof. Henshilwood and his team explain the various layers found in the site. When it comes to a discussion of the diet of the cave inhabitants, it is clear that their relationship with the sea and sea creatures was paramount to their survival in this region. Prof. Henshilwood explains that their findings in the various cave floor layers indicate a diet consisting predominantly of fish and shell fish. According to the archaeologists, the presence of fish in the area was vital for nourishment as well as providing the omega oils necessary for human brain development. One of the best indicators of the presence of 'modern' humans at the site, according to Dr. Karen van Niekerk, assistant director of the project, are the 41 tiny shell beads discovered in a layer dated to some 70 000 years ago. Karen explains that these tiny shells belong to the mollusc genus

N*assarius kraussianus*. Today these creatures are still to be found growing on the estuarine grasses near the shallow mouth of the Goukou River in Stilbaai, some 20km to the east.

My time in the Blombos Cave leaves me with a sense of just how deeply connected and reliant these early peoples were upon the marine ecosystem. From their expressions of identity in the form of beads to the rich fish diet and relative abundance and ease of accessibility of seafood in the area, these early *strandlopers* (beach walkers) the coastal peoples, developed and extended networks into the water. Leaving the cave and the team of archaeologists, my friend Jack and I decide to walk the 15km of rugged coastline back to Jongensfontein, the coastal hamlet some 6km west Stilbaai. Arriving in Jongensfontein it is still early in the afternoon and, feeling confident in our stride, we elect to continue the remainder of the trip back to Stilbaai along the coast. Traversing high cliffs and rocky bays interspersed with sandy swathes of white beach we came eventually to *Skulpies Baai* (Shell Bay), an area renowned locally for its stunning beauty and first-rate angling opportunities. Skulpies Baai is also home to a remarkable legacy of fishing in the form of a series of large *visvywers* (fish traps), constructed by coastal dwellers thousands of years ago and maintained to this day by local people, some of whose families have held ancestral fishing rights for over a hundred years.

Fish traps

At many locations along the inter-tidal zone from Mossel Bay some 85km east of Stilbaai to the Blombos region 30km to the west, one can spot the tidal fish traps in sheltered bays near the shoreline where the bottom is shallow and relatively flat. Constructed by the Khoisan *strandlopers* out of locally sourced sand- and limestone found below the sea cliffs, the traps are amongst the earliest evidence of organised subsistence fishing still in existence (Meij & Mathiesen, 2009: 5). Initially, suggest Meij and Mathiesen (*ibid.*), the stones were packed in a half-moon shape in naturally existing gullies or tidal pools. With time and developments in packing, the traps became larger and constructed on top of suitably flat bedrock. Meij and Mathiesen(2009: 6) explain that whilst the tops of the trap walls are flat, the seaward side slopes gently, enabling fish to swim over and into the trap at high tide. Conversely, the inner wall of the trap is vertical and if well maintained is kept clear of debris and silt, allowing the trap to drain efficiently when the tide flows out. The walls of the traps are tightly packed and are built to a level which is covered by between 0.5 and 1m of water at spring high tide (*ibid.*). Traps are usually built in a series, in front of and alongside one another. Their walls can range in length from 5m to over 200m and their area can occupy from $10m^2$ to well over $500m^2$ (*ibid.*). In their "*The Fishtraps of Stilbaai*", archeologists Meij and Mathiesen (2009) argue that while archaeologists have calculated the

remaining fish traps' ages at around 3000 years, the development and evolution of these traps lies much further back in prehistory.

The efficacy of fish traps is based not only on their precise construction but also on contributing environmental, tidal and lunar conditions: a spring high tide beginning at the right hour of day is necessary to flood the traps as well as a cloudy night or new moon (Steyn 1996: 62; Meij & Mathiesen 2009: 3). Fish enter the traps with the pushing tide but due to the low light conditions, are unable to tell when the tide is receding (Steyn 1996: 62; Meij & Mathiesen 2009: 3), leaving them trapped until the dawn hours when fishermen come to harvest before the next high tide affords the fish an escape route. Even if the trap construction and requisite climatic, lunar, tidal and water conditions are right, even if fish *do* swim into the trap, this is only the beginning of a very complex process of interaction between hunter and hunted. Most fish possess very good eyesight, even at night and are thus far better equipped to operate in the dark than the trap fishers. For a trap to work successfully, it must be well maintained and kept to a specific height. A moonless night is required with a strong spring tide to wash small fish and fry inshore. The lack of visibility and the high tide means the fish are unaware of their predicament and the receding tide renders them trapped in the pool, itself draining but at a rate comparatively slower than the surrounding gullies. It is then that the fishermen will walk out to the outer walls, herding the fish in towards the beach where they drive them onshore and scoop up their prize. The traps, as mentioned earlier, are often vast in area, the bottom topography varying throughout, and require a great degree of skill and understanding of fish behaviour and movements from the small group of fishers to herd large, elusive shoals. As Oom Abel put it "it is a lot like that saying – trying to herd cats". The fishers must know their trap space intimately in order to make use of their knowledge of fish movements. Unable to see the fish moving in the dark under water, they make use of a wealth of accumulated knowledge concerning the ways in which particular species of shoaling fish move when chased. The ability to theorise and act upon the unseen movements of fish in their natural habitat (albeit slightly modified to suit the fishers) – suggests the ability to think like fish in order to catch them which has continued to develop emergently into the present day fishery. It is a theme which recurred throughout my research and is dealt with in depth in the final chapter.

The work is demanding and requires askilled team effort, resulting, through the centuries in the formation of various family, friendship- and kinship-based groups to maintain the traps and catch the fish. Speaking with fishers it was these v*isvywer* models were the basis for many of the current loose collectives amongst handliners.

Since the settling of Stilbaai in the 1800s, the fish traps have been mostly passed from father to son and maintained by kin or family groups from Melkhoutfontein, Stilbaai and surrounding farms (Steyn 1996: 26). In the 1900's, corporations were formed and the catch divided amongst members (*ibid.*). Today most of the traps are still maintained either by concerned local farmers and a few residents from Stilbaai and Melkhoutfontein (whose families still lay claim to and harvest fish from the traps occasionally), the Hessequa Society for Archaeology, or the Land Service Club of the local Pikkewouter primary school (Stoffberg 1998: 27; Steyn 1996: 62; Meij & Mathiesen 2009: 1). With the implementation of the 1998 Marine Living Resources Act (MLRA), all fish traps were declared off-limits and even ancestral rights holders were forbade from harvesting and instead encouraged to perform routine maintenance to the trap walls for a small fee.

Melkhoutfontein

The history of Stilbaai and fishing since the early 1800's is inextricably bound to the development of the original Melkhoutfontein settlement. Although Melkhoutfontein and Stilbaai are now intrinsically linked through fishing, this was not always the case. The history of Melkhoutfontein is limited until the year 1835 up until which time it had been a farm, *Melkhoute Fonteyn* (lit. Milkwood Fountain, referring to the abundance of Milkwood trees and natural freshwater springs or *fonteyne* in the area) (Louw *et al,* 2006; Steyn 1996). In 1853, this land was surveyed and subdivided between Bartholomeus Saayman, Danie Jacobus Malan and others unnamed (Louw *et al,* 2006; Steyn, 1996). Later, in the year 1872 (Steyn, 1996) this land was again subdivided and a 50 hectare portion purchased by the Anglican Church for the purpose of erecting houses. It was this 50 hectare plot which formed the original basis of the Melkhoutfontien settlement which still exists today.

Steyn (1996: 40) writes: "long before Still Bay became known as a holiday resort, there was a fishing community at Melkhoutfontein". It is not possible to discern precisely when this fishing community began, although Louw *et al* (2006), from their collected memoirs of older Melkhoutfontein residents tell of how, from the earliest days of Melkhoutfontein's existence, local residents would fish in the nearby Goukou River with home-made hand lines or nets. At that time, fishing remained a matter of subsistence. Later, towards the late 1800's and early 1900's, farmers who owned the subdivisions of the original Melkhoutfontein farm provided residents of Melkhoutfontein settlement with wooden flat-bottomed boats in which these tremendously courageous and knowledgeable men rowed out to sea to fish (Steyn, 1996; Louw *et al,* 2006). A portion of the catch was duly given to the boat owners in payment and crews traded

with farmers and other residents of Melkhoutfontein for vegetables, tobacco and other agricultural products (Steyn 1996; Louw *et al*, 2006).

Stilbaai and the development of a fishery

The town of Stilbaai itself developed comparatively later than Melkhoutfontein. Historian of Stilbaai Helene Steyn, in her comprehensive (1996: 1) work on the town, suggests that the name Stilbaai was coined somewhere "between 1883 and 1895". Contrary to the more utilitarian subsistence development of Melkhoutfontein, born out of farming and fishing, Stilbaai developed primarily as a holiday resort. This said, fishing was certainly on the minds of the first holiday-making farmers who built in the new resort: the first applications to build in the area (prior to its' being officially named) were submitted in 1866 to the Civil Commissioner of the area by a number of farmers and residents from the inland town of Riversdale, requesting that land be divided so that they might "…erect cottages for private use during the fishing season" (unidentified quote in Steyn 1996: 2).

By 1929, local Melkhoutfonteiners and a few Stilbaai residents had been plying a basic subsistence and small-scale commercial handline fishing trade for a number of decades. However, the rapid expansion and technological update of the fishery came in that year with the arrival of one Matthys 'Thys Vissie' Lourens Cronje, hailed by Steyn (1996) as the progenitor of the contemporary commercial handline fishing industry in Stilbaai. In 1929 Thys Vissie began construction on a small fleet of fishing boats with the view to take advantage of the region's superior fish stocks and favourable sea conditions. After four years of petitioning, in 1933 Thys Vissie's patience was rewarded when the Provincial Administration agreed to fund the construction of what is now the Stilbaai harbour to the West of the mouth of the Goukou River. Work was conducted in phases throughout the 1930's until completion in 1939 (*ibid.*). In 1940, Thys Vissie launched Stilbaai's first motorised commercial fishing boat, *Felix*, using the earnings derived from this boat to equip all of his other commercial craft with engines (*ibid.*). With the introduction of commercial handlining and motorized craft, fishermen were now able to target species at greater distances from shore as well as catching far more fish than previously. This period signalled the end of the subsistence fishery and the beginning of an era which continues today; that of Stilbaai as commercial handline fishery.

Today the majority of boat crews still hail from Melkhoutfontein with a number of prominent skippers and boat owners also emerging from there since the end of the Apartheid regime and the implementation by government of interim permit relief solutions which part-fund skippers in

purchasing boats and equipment. With the growth of the mechanised fishery have come a number of significant changes in the technologies, infrastructure and methods used to catch fish. Buoyed by consistently high catches of Hake, Geelbek and Kob since the early 2000's, Stilbaai has seen a resurgence in popularity amongst commercial fishers in the past decade with some 35 commercial handline boats now working permanently out of the harbour.

Boats and technology

Fig. 1. The boat *Dreamtime* on the slipway. White building in background is abandoned I & J fish processing factory.

Thys Vissie's intervention of placing a motor inside a *bakkie* boat – essentially a wooden skiff constructed in the 'clinker' fashion – paved the way to an increasingly technologically-driven fishing vessel. Today's boats are quintessential actors in the fishery, carrying their crews on trips that can last two days and cover a few hundred kilometres. Built of wood and fibreglass with a maximum length of nine metres, the craft are generally constructed without a cabin area with the majority of the floor area covered in deep open bins for holding fish. Each boat is equipped with an array of technologies. By law all commercial craft must sport two engines, each of equal output, usually ranging from 40-90 horsepower. Spare petrol canisters and tanks occupy the rear of the boat depending on how far the skipper intends to travel on the trip.

Fig. 2. Commercial ski boats at the harbor. Double-storey white building is Viking fishing HQ with factory situated on the bottom floor at the rear of the building.

Towards the front of the boat is the console area atop of which a small windscreen is usually mounted to shield the skipper from crashing waves and spray when navigating. A shelf runs below the windscreen and this is where the GPS, Sonar fish finders and other instruments are located. Most boats, dependant on size and licensing stipulations, must carry a vessel monitoring system or VMS onboard. The VMS relays signals to DAFF officials at regular intervals, allowing them to track the movements of craft within the fishery.

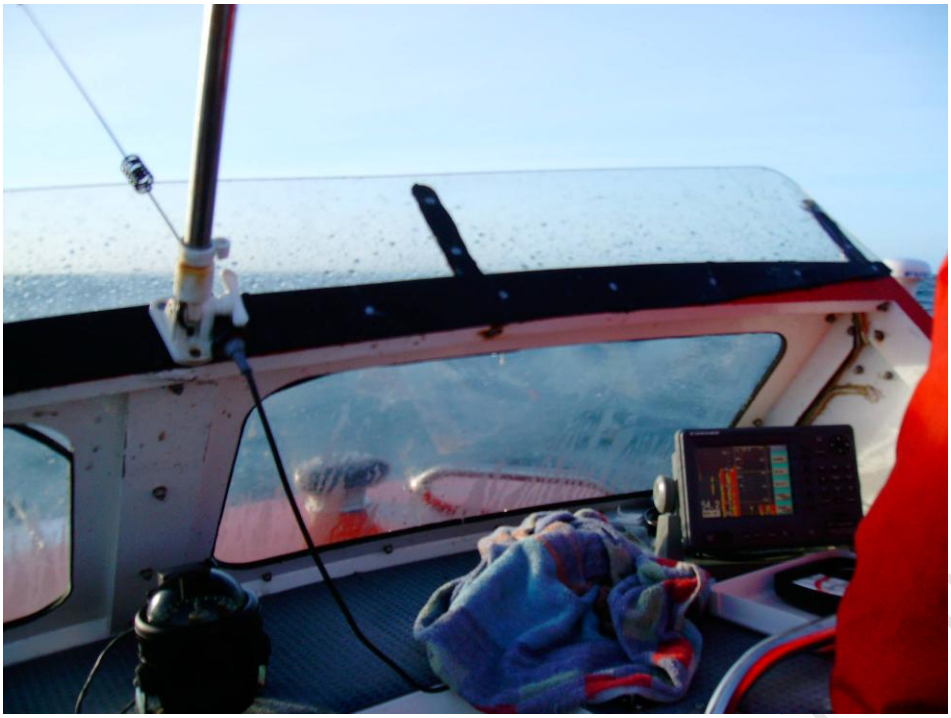

Fig. 3. Typical technology found on the boats. The white mushroom-shaped VMS antenna is just visible to the right of the Perspex screen. Colour screen is Sonar fish finder. Base of thick GPS antenna is visible with GPS unit covered by a towel to protect it from sea spray. Spiral cellphone booster aerial attached to GPS aerial. Black electronic compass is visible in the bottom left of the picture. Out of the picture to the left of the cabin is the long-wave Vhf radio antenna.

The boats are all licensed as handline craft and as such, fishers are limited by the licensing stipulations to handline rigs in order to catch fish. A typical handline rig comprises a length of nylon line attached to a stout piece of wood approximately 20cm long by 10cm across. One end of the line is secured to the wood and when not in use, the line is wrapped around this. At the other end of the line a hook and various lead weights are attached depending on the type of fish being targeted, the strength of the currents, amount of chop on the sea surface and the type of bait used. Once a fish is hooked the line is pulled in quickly in a hand-over-hand motion until the fish is brought onboard, usually killed (dependant on the species) by a blow from a short wooden club to the head or an incision in the gill area and placed in one of the storage holds. The line is re-baited and the process repeated until all the holds are full, the fish stop biting or can no longer be located.

Fishers

Having provided a brief overview of some of the historical developments and the timelines upon which these were played out, I would like to tighten the gaze of this historical enquiry and focus more specifically on some of the number of the fishers who were influential in my research. It is my sense that before exploring the relationalities, adaptive strategies and ethics of these fishers it is first necessary to introduce and provide a brief history of each[15].

Oom[16]*Tem*

Driving into Melkhoutfontein is always a treat for me – the streets are alive and if ever there were a picture postcard of community building, social and economic reform for the country this would be it. The turnaround, according to locals, is nothing short of miraculous – once one of the most disenfranchised and poverty-stricken communities in the country, Melkhoutfontein today is hailed internationally as a model for success in developing countries with its programmes of social and economic upliftment through tourism and infrastructure development winning awards as far afield as England and most recently Norway.

It is the holiday season and the streets are lively. Children are playing football, skipping rope, playing catch, chatting and cavorting. Driving slowly down the wide streets I admire the houses, many of them brightly painted and sporting a small front garden or vegetable patch. Make no mistake, this is still an impoverished rural community, a throwback to the Apartheid era, but there is an overwhelming sense of hope and pride, made manifest through the clean streets, smiling people and the visible attempts to brighten and develop the area and its people. Driving to the end of Sonskyn Straat (Sunshine Street), I come to a stop in front of a comfortable double-storey house, seemingly out of place amongst the single-storey homes. Oom Tem Michaels is standing at the entrance to his garage wiping his hands on a rag.

Dressed in a long grey-blue wool overcoat and dark blue beanie, Oom Tem appears the picture of the consummate seaman even when on terra firma. He has a wise countenance, enhanced by a *fumanchu*-style beard and bright, lightly coloured piercing but friendly eyes. He extends a hand and welcomes me into his neat home. A brass barometer takes pride of place in the kitchen area,

[15]I worked with a number of skippers and crew not discussed here. However, the fishers introduced in this section were the most influential in my research for a number of reasons. Some were people I went to sea with while others offered challenging perspectives and insight into ways of relating to fish and the sea.

[16] 'Oom' is both a term of endearment and respect amongst Afrikaans speakers and is generally reserved for someone older than oneself.

polished to a reflective sheen. We sit on high-backed chairs around the kitchen table but Oom Tem soon transfers himself to a sofa across from me, saying in a measured tone (in Afrikaans) "excuse me for sitting here but my back is sore from so many years at sea and I want to be comfortable and able to give you my full attention"

A man of the sea from a young age, Oom Tem has spent the past 35 years of his life plying his trade on the east and west coasts of South Africa, starting out as a teenager fishing out of Stilbaai harbour and progressing for 10 years to the west coast as a Snoek and Hake fisherman on both longliners and skiboats. He has now "come home" as he puts it, buying himself a ski boat some 10 years ago and now fishing out of Stilbaai harbour once more. Oom Tem has spent much of his life in Melkhoutfontein. As a coloured man, for years under the apartheid system he was limited to crewing for skippers but in 1998 applied to MCM for interim permit relief under the provisions of the MLRA and secured a government-backed loan to buy a trailer, boat and motors. Today he has a successful boat and crew but has begun to plan for his retirement.

Oom Abel

Oom Abel grew up in Melkhoutfontein. As a member of the Kleynhans family who have resided in the area since the mid 1800s Oom Abel grew up in a fishing family. Initially Oom Abel told me, his ancestors worked as farm labourers. Their fishing careers had started out as esturine subsistence trips to supplement food supply in times of need. During the ensuing years, abundant catches and the advent of local mechanised fishing approaches saw the Kleynhans family's stake in the fishery grow significantly, culminating in Oom Abel's purchase of a large commercial skiboat in the mid-2000s with the support of an interim relief permit and funding from goverment to buy necessary equipment. Today Oom Abel is one of the most successful of the local fishers and has worked in a number of fisheries aroudn the South African coastline with a significant portion of that time spent as both skipper and crew fishing Hake and Snoek on East and West coasts respectively.

Oom Jannie

Arriving at his painstakingly neat single storey house in a peaceful suburban area of Stilbaai I'm greeted at the front door by Oom Jannie's wife who shows me through to the back yard where he is working on the wheel bearing of a boat trailer. Dressed in a long grey work coat he hunches with his back to me working steadily away at the corroded metal. Having celebrated his birthday the previous day, Oom Jannie is a remarkably fit and healthy looking sixty-something with a

natural olive complexion accentuated by a dark tan, the mark of fishermen in the area and an indicator of decades at sea.

As he hears me approaching, Oom Jannie wheels up and around, simultaneously pulling his coat off and tossing it in the boat. It's a practiced gesture and one which marks a distinct shift from work frame to discussion frame. Leading the way, Oom Jannie walks back towards the house and pauses to usher me into the comfortable living room.

We sit on plush leather sofas which look and smell as though they receive very regular leather care treatments. Before sitting, Oom Jannie has walked from couch to couch and eventually elected to sit in one of the armchairs. I shift my position on the big couch where I'm seated to face him.

Oom Jannie began his fishing career in Mossel Bay in 1968 and first came to Stilbaai to fish in 1976. He has worked as a fisherman since leaving school and fished the East and West coasts extensively. He fished with the Schoeman brothers (authors of many classic fishing books and prominent shark fishers) in the 1970's and has owned and operated everything from Crayfish boats on the West Coast to Pilchard vessels on the East. He opened and operated the only Pilchard processing factory in Mossel Bay for many years before the industry all but dried up and the sale of his Pilchard vessel went sour. With the loss of his vessel, Oom Jannie was forced to come out of semi-retirement and again take up a life at sea, this time working out of Stilbaai as a commercial handline operator. He was drawn to the area for a number of reasons; the quiet life, good Hake and Geelbek[17] prospects and proximity to fishing areas he knew exceptionally well.

Some 10 minutes later and we're talking shop, discussing current permit and quota regulations. Leaning towards me, Oom Jannie catches me unawares when he says "you know, I don't believe this whole climate change thing is really affecting us here anyway. I mean, if the climate was changing then surely the *stroom* (currents) would be changing as well!? But they're still exactly the same as they always have been for the forty or more years I've been fishing around here – just before – maybe a day or so – the Easterly winds blow, the current moves towards the west and then the same just before a westerly wind comes, the currents flow to the east. It's always been this way…"

Oom *Koos*

[17] Species of locally caught fish.

Some 100 meters down the road from Oom Jannie lives Oom Koos. By contrast with Oom Jannie's immaculately manicured grounds which belie the range of fishing implements and gear in the work areas behind the house, signs of Oom Koos' livelihood are parked around his house when I arrive. Suffice it to say that his house was not difficult to spot as that of a commercial fisher. Numerous trailers, boats and motors in various states of repair, a small freezer truck, raised Toyota Hilux towing vehicle dot the outside of the property. Like Oom Jannie, Oom Koos has converted his double garage into a workshop. Since I am a few minutes early, I walk around cursorily inspecting the equipment. As I stand atop a galvanized boat trailer, Oom Koos pulls onto the big open front lawn. A large man, deeply tanned, with large, rough hands, Oom Koos is jovial and friendly, inviting me into the house to drink coffee with him and chat about the fishery. Oom Koos began fishing in 1978 and first came to Stilbaai in 1981. A keen recreational beach and ski boat angler for most of his life, when he retired as a warder for the prison in Mossel Bay Oom Koos applied for a commercial handline license. At that time (the late 1990's), fishing in Stilbaai was at a high, Koos tells me, with consistently large catches of Hake and Geelbek marking the bay out as a profitable place to live. The recently retired Koos applied for both A (Hake and other *stokvis*) and B (Kob and other handline species incl. Steenbras, Red Roman, Sharks etc) licenses respectively and was fortunate enough to be awarded both, entitling him to target a wide range of species. Today Oom Koos has made use of organisational skills learned whilst employed by government to navigate the tricky networks that are DAFF, making him indispensable to fellow fishers in Stilbaai wishing to apply for license changes, boat swops and all manner of regulated procedures. His connections within the department are highly regarded and he is often sought out to remediate problems. This position has also seen him rise to prominence in a more formalised role as head of the local commercial handline fishers association in Stilbaai.

Boetie

Like Oom Tem, Boetie[18] Groenewald grew up in Stilbaai. One day in late 2010, returning with Boetie from a trip to sea, we were forced to wait to starboard of the slipway to allow a recreational boat to launch. Identifying the owner as a childhood friend, Boetie greeted him merrily and then turned to me saying in Afrikaans "yes, he's a clever guy that…and lucky too. We grew up poor together, friends who had nothing - with just a little fishing net and our underpants for a swimming costume we used to catch little fishies there (pointing to the beach)

[18] 'Boetie' is a colloquial Afrikaans name for someone of a younger generation than oneself and as one of the youngest skippers and boat owners in the fishery everyone refers to him affectionately by this nickname.

in the rock pools, pretending we were at sea like my dad catching monsters! (laughs)". Boetie's father, Attie Groenewald is a popular figure amongst most of the fishers and highly respected by locals, not just fishers. In the foyer of the municipal offices in Stilbaai there are six large framed photographs depicting scenes from Stilbaai life – people luxuriating on sun-kissed beaches; frolicking in waves. In the centre is a picture of a smiling Oom Attie on his boat pitch-black boat, *Overdraft*, with fully laden holds, Kob packed to the gunnels.

Boetie has contended with a lot of hardship over the past decade or so. Embarking on his own career as a skipper having crewed for years for his father and other skippers in Stilbaai, he invested his savings into a boat, motors, tow vehicle, and hi-tech equipment. When the new licensing system was passed in the early 2000's, however, Boetie's applications for both A and B licenses were declined, rendering him without a means of deriving income from the sea, the only livelihood he had known since childhood. Today, Boetie holds a B license, entitling him to catch Kob and other handline species including certain species of shark. However, when his new license was granted, the stipulations allowed only a three-man crew instead of the regular five or six on most other boats in the fishery, meaning Boetie and only two others are entitled to catch fish from his boat, *Dreamtime*. Where many would see this as a potential hindrance, Boetie cheerfully dismisses what he sees as a slight against him by DAFF, telling me that he and his small crew are so efficient that they are often able to match the far bigger crews in terms of catch weight and thus make more money per man.

Oom Louis

The first time I met Oom Louis was at Oom Koos' house. The following description is from my notes on the day:

Oom Louis arrives dressed in black rugby socks and a golf shirt, sporting a tired looking peak cap. Stocky and well tanned with thick, calloused hands and a vice-like grip he envelopes my hand in his as he asks me my business in the town. As I introduce myself and explain my research interests he cuts me off with: "Everybody calls me Louis Talisman or just plain Talisman. It's probably because the boat is called Talisman but I think it also has to do with my luck – a classic 'chicken and the egg' story you know, hey – like I was the talisman for the boat's luck and it for me. We've rubbed off on one another now so I won't sell her that's for sure – what would my name be then anyway!?".

Oom Louis, is quick to inform me of his passion for conservation, a theme which he reiterated many times when we were together. For him the sea is more than a job or economic resource.

His body language and accompanying stories suggest a deep affinity for the sea, kindled as a child when he was working as a junior crew member for his uncle in nearby Gouritz during his school holidays.

> Oom Louis: What better way for a kid to grow up than in those days, ey? Those days you see, there was also plenty of fish but you didn't have to go so far to get it – and we were the only boat going out of Gouritz at that time so it was too easy. Mind you they didn't bite as *mal* (lit. crazy) as they do nowadays so we didn't catch as much but you didn't need to because there was no competition. We just sold all of that fish in the town and divided it up amongst ourselves. It was a good, healthy time back then and the fishing trade was not so cutthroat and dangerous for your stress levels as it is today hey! Now you must be a businessman, a lawyer, a what d'you call it – umm lobbyist, PR okie, everything PLUS being a fisherman! Its hard work now of a different kind, you've got to remember somewhere in there now to fish as well! S*** its hard! But its lekker life on the sea so I don't complain and at least I'm away from shore and other men's k** and because I'm skipper I can choose my own crew which helps – until they give me enough s*** and then they're out! (laughs)
>
> OL: "I've been here now fishing in this area for close on 40 years now and I love it always like nothing else I've ever done. Especially now with the prices right for the good fish we're catching. It's just those b****** trawlers okies who're buggering it up for us handliners you know!?! Like I said before to you, they catch too much fish too easily and then they bring the price down for us, even though the quality of the fish that we catch is so much better – not bashed together and stressed in a net and then dragged and dumped on a deck and thrown in a hold, then frozen – that's a k** way to deal with fish man – that's a k** way to deal with an animal! If you did that with buck when you went hunting or even cows in a field you'd not be able to eat or sell your meat! I've been hunting for many years now and I tell you, if you ask those hunting *oukes* what they think about it they'll tell you the same - if you treat an animal right before you kills it, then it will taste so much better than that one which was badly shot and then run down – it stressed before it died and the flesh tastes of blood - I've had that before with tuna and yellowtail – when you catch them and the guys pose for photos and the things' still breathing man, they stress and then the flesh tastes of iron like there's too much blood in there. That's what trawler fish tastes like to me – if I eat a piece of fish at your house I'll tell you straight away how it was caught – the same fish, take a Kob and catch one in a

river, another off the (ski) boat and the last one on a trawler in a shoal and I will guarantee you I can tell the difference.

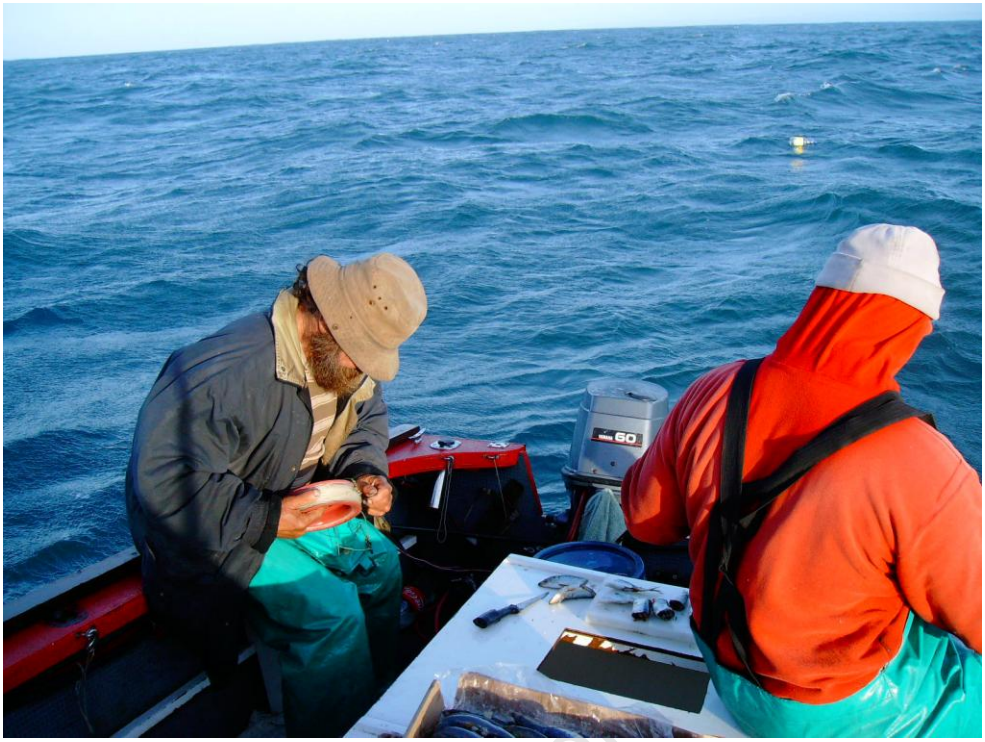

Fig. 4. Crew member prepares his handline while another readies Anchovy bait.

Whilst boats and fishing technologies such as GPS, VMS and Sonar fish finders are commonplace in the life of the commercial fisher, the human element of trust and kinship remain strong in many instances. Just as the process of catching fish in the *visywers* was highly specialised and hinged almost entirely on the fishermen's ability to read the weather, water, moon, wind and tides, so it remains today. Steyn's history of Stilbaai, Melkhoutfontein and Thys Vissie reflects a strong sense of community and "*samewerking*" (Afrikaans for working together). This sense of collective strength is echoed today in particular amongst the fishers who ply the bay's waters. Oom Tem explained:

> OT: You see, my Grandpa was a fisherman. I grew up here with him teaching me on the river banks to fish at night. He and my father were good fishermen, very, very good and they went out to the river or the sea at night and caught lots and lots of big fish. My uncle also went with them always and his son who was older than me, he also went with them when he was old enough, maybe 12 years old. So I was always seeing fish and fishing and that's all I knew. A lot of children grew up (like this) in my time and my

> father taught them and their fathers taught me and we all learnt and watched and fished together, you see? And we all still fish together and help out in the community when it needs doing and when we can, you see?

Today in the fishery, friendship and family groups remain important. Oom Abel explained in one of our conversations how members of the same family were often to be found on different boats but worked with their respective skippers, sharing information openly and often encouraging skippers to communicate:

> Oom Abel: I tell you, for example, neh, I have Bossies on my crew, right. And his brother Koos is on Oom Fish's boat. They will talk at the end of the day and exchange stories. Then they go to their skipper the next day and say "sir, yesterday Oom Fish caught good Kob off the *Vlaksteen* [lit. "flat rock", a popular reef] – we should maybe work with them today because it was too much fish for them to catch".

Boetie and Anton are young skippers in their late twenties and are another prime example of the depth and strength of friendship-based relations in the fishery. When catches were good, Anton and Boetie would communicate incessantly whilst at sea searching for shoals of Kob. When the fishing soured dramatically they came together even more loyally, seeing themselves as a team of sorts. Discussing the increasing distances which fishers had to travel when the Kob fishing began to decline in later 2010, Boetie stated:

> Boetie: Ja man, without (Anton's) big boat, me on my little boat I'd be shot. (Anton) can go out further and radio me if (the fish) are there or not. Then that way I don't have to waste petrol and I can look over the shallow banks for him which is better because I have a smaller boat with only 2 crew so hauling anchor is easy and I don't scare away the fish by casting a big shadow over the reef.

In 1960 (Steyn 1996: 42) Irvine and Johnson (I&J) fishing company opened a cold-storage unit at Stilbaai harbour[19]. However, from 1970 onwards, we are told (Steyn 1996: 42-44) that the fishing industry in Stilbaai took a turn for the worse. Some blamed oil tankers, others over-fishing. Whatever the case, reports Steyn (*ibid.*), in 1995, in excess of 150 commercially viable ski-boats were registered in Stilbaai but only seven of these were being used to fish commercially.

[19] The current Viking Fishing-owned factory cold-storage unit at the harbour is a contentious space for many of the fishers including Oom Koos. In the discussion of strategies in chapter four I discuss this in greater detail. See also Oliver Schultz' (2010) dissertation on the problems associated with freezer factories.

The late nineties, again took a turn, this time for the better; respondents in my early interviews talked of the late 1990's and early 2000's as seeing an influx of good quality Hake and later, Geelbek (lit. Yellow-mouth) spanning the area between Gouritz and Blombos (a stretch of coastline some 80km apart). Driven inshore by colder waters, these excellent eating fish fetched high prices and the fishery began to grow as more boats moved to the area including some of the key respondents referred to in this dissertation.

It was during this time period between the mid-1990's to early 2000's that Stilbaai witnessed an influx of commercial handline fishers. The resurgence of interest in the bay as a commercial fishing hub and the subsequent arrival of these professionals to the area resulted from a number of profound shifts in circumstance. These included changes in average water temperature, favourable offshore wind patterns. Fishers were also supportive of MCM's (2004/5) regulations pertaining to minimum and maximum allowable lengths of Kob as contributing to the significant increase in their stocks in the bay. Rather than contesting the new regulations, fishers suggested that the size regulations were a positive step. Clearly there was support amongst the fishers for the policies of MCM/DAFF, an encouraging prospect in when one considers prospects for collaborative social-ecological research and management.

> Oom Jannie: You see under this new system, they (MCM) changed the minimum sizes of Kob from forty to fifty centimeters. But for maybe two years…we struggled…there simply wasn't enough fish of that bigger size around to catch! But you see, this took pressure off (the Kob) so they could breed. And I tell you something else…a fifty centimeter female, when she spawns, is able to make far more eggs than a forty centimeter one…much, much more! So suddenly after two years we have lots of fish. And big ones – ten kilos sometimes and more! Also the number of fish you have to catch to fill a boat has decreased because they're so much bigger and heavier now!
>
> …in the past, neh, when the minimum restrictions were set at forty centimeters, fishermen had to catch approximately two hundred and fifty fish in order to make up a tonne. Now they catch just one hundred or a hundred and fifty fish to make a tonne.

In an earlier interview, Oom Koos had expressed a similar opinion. In this conversation, I asked Oom Koos the reasons for the prolific Kob hauls at that time:

> Oom Koos: I think it is that MCM change the sizes – you see in the past – to caught a bucket of fish – fifty kilos then you must caught on the old sizes, neh (40cm minimum) seventy six fishes to make a bucket. Now its five fishes. Yes, five fishes, ja, because all of

the fishes is between nine, ten, eleven kilos now if you want to catch a tonne – these previous years before the change they didn't catch tonnes – now it's every second day – two tonnes, three tonnes, that is what we caught a month ago. Per boat hey! On one day, one trip, in two or three hours' time. Ja you see now what's happened, in the past to catch a tonne, you must catch about two hundred and fifty fish, now to catch a tonne its one hundred fish or less. You see, so ninety percent of the boats that fish in the sea, stays in the water and that's every day and every day – there's not so much fish – individuals that you take out of the water – that is why – that is how I see it, that is why the fish stock is become so much better.

Conclusion

I have sought in the course of this chapter, to introduce a brief history of the Stilbaai fishery from its ancient history through to the present fishery conditions as I experienced them during my time there from early 2010 to early 2011. This is by no means a complete representation of circumstances – such an undertaking would be exhaustive and simply too large for the current work. This in itself points to the incredible complexity of the Stilbaai fishery and surrounds. Steeped in history, it is an emergent site of complex interactions and enactments, some of the more noteworthy of which will be covered in greater detail in the forthcoming chapters. In what follows I draw on the concept of anamnesis recurrently as a means of reimagining and reinventing the stereotypes of fishers so entrenched in current state line fisheries management structures. In so doing, I hope to challenge these with ethnographic data obtained in the field and through these processes, point to new ways of fishers and researchers working together with fish.

Chapter Two

Convergences, concerns and collaboration

> "About 6 years ago we were in Gouritz...and for the whole of December, the water here was as hot as Durban's water – it was 22, 23, 24 degrees (Celsius) the whole of December...the water was so hot there came a lot of tunny (Tuna) with it!"
>
> - Oom Louis, 2010

In the research and literature on fisheries management, arguably the strongest growing voices are of those who recognize the importance of working with the inherent complexities of fisheries which are revealed through social-ecological approaches. These in turn, emphasize the interconnectedness and mutual influences of humans and marine ecosystems (Berkes, 2011; Neis, 2011; Murray, 2011). Proponents of such approaches advocate a process of co-management which draws on the knowledges of local fishers, integrating these with those of science and new forms of management (Ommer and Team, 2007; Neis, 2011; Murray *et al,* 2006). The notion of co-management, born out of social-ecological concerns, is presented largely as an alternative to the perceived failure of stock assessment-based management. The latter continues to dominate the South African government's engagement with the sea, relying on top-down, single-species evaluations derived from quantitative data (Sowman, 2011). Premised upon a separation between nature and human society, it has been criticized (Berkes *et al*, 2001; Hauck & Sowman, 2003; Ommer & Perry, 2011) for largely failing to recognize the interconnectedness of humans and marine systems, or fishers and fish. Moreover, a stock assessment science's reliance upon the production of quantified data opens it up to the risks of 'data fouling' including the distortion of data by misrepresenting total catch or dumping over-catch (Ommer and Team, 2007).

Writing on the challenges of EAF research in Canada, Ommer and Team (2007) suggest that in order to effectively work with (rather than 'top-down' manage) a fishery, knowing the health of the ecosystem is paramount. This in turn, posit the authors, is dependent upon the ability of

researchers to accurately calculate the "true size and composition of fishing mortality" (2007: 70) in that ecosystem. Yet reliance on purely qualitative data to achieve this has been shown to limit the ability of research to account for ecosystem-wide complexities. In response to these challenges, an EAF mandates that data be gleaned from a range of scales and perspectives from the international to the national, regional and local (Ommer and Team, 2007) including scientists, managers and fishers. A number of studies have shown that fishers' knowledges may improve research and data concerning fish stocks, ecological change and other factors, particularly where local-scale data are concerned (Stanley & Rice, 2003; Stead *et al,* 2006; Ommer and Team*,* 2007*;* Murray *et al,* 2008). As inclusive as this sounds, working with the knowledges of fishers in conjunction with those of social and natural science researchers is a challenging undertaking which runs many risks including marginalizing experts in the very process of seeking to integrate their perspectives and expertise. An EAF suggests that practitioners integrate contextually-derived knowledges through an interdisciplinary approach which seeks to overcome the binary separation of nature and culture, subject and object (Sowman, 2011; Ommer *et al*, 2007): no small task considering the modernist binaries characteristic of the bureaucracy of state science and stock assessment-based management. Furthermore, an EAF emerges out of collaboration between the scholarly natural and social sciences - it seeks to integrate fishers' knowledges (Sowman, 2011) into itself but is inherently representative of particular assumptions about the nature of the world. The challenge facing the project of integrating fishers' knowledges into research and management objectives is that it inherently implies that knowledges are bounded and distinct from one another to begin with. It also risks translating the knowledges of fishers into established discourses of academic scholarship, the intellectual heritage of which lends them great power in knowledge debates.

Discussing the prospect of working with multiple knowledges in social-ecological research Neis (2011) asserts that the debates around 'local ecological knowledge' (LEK) which have played out over the past few decades have resulted in a stratification between scientific and local ecological knowledges. Neis (2011) suggests that while all knowledge is embedded in social-ecological systems, those in which scientific knowledges emerge differ from those of local fishers' knowledges because scientists receive training and adhere to methodological paradigms which compel them try and generate knowledge that is universal, repeatable and spatio-temporally acceptable regardless of where it is received or used. In order to achieve this, scientific methodologies emphasize experimentation and quantitative data over anecdotal observations and

other qualitative data (*ibid.*)[20]. Implicit in this is the suggestion that scientists' knowledges emerge in networks of research while those of fishers emerge from networks of experience. In this chapter I challenge this notion, showing that the categories and notions of silos of knowledge are not hard and fast.

In this chapter I argue that particular assumptions, interactions and emergent ways of relating to others inform ways of being in and relating to the world. Where distinctions are made to designate spaces between knowledges these impair respectful and meaningful dialogue and collaboration. To speak of knowledges in bounded terms ignores the significant overlaps and convergences which relationalities may share. By way of ethnographic examples and a relational ontology (Law, 2004), I argue that the distinctions between 'fishers' (experiential) knowledge' and 'scientists' (research) knowledge' are far less stable and bounded than they appear. I introduce a number of convergences, a 'fisher' conducting temperature monitoring and a 'scientist' deriving ecological knowledge from fishing experience.

In the context of working with different knowledges, the approach that John Law (2004) and others describe as a relational ontology provides a means of moving beyond the apparent given nature of categories and distinctions of knowledge. Where a cultural ontology rests upon notions of fixed identity, a relational ontology concerns itself with the networks and interactions between actors that allow them to perceive one another and in so doing, bring one another into being. It acknowledges relational engagements as fluid, changeable and emergent. The approach shows that knowledge claims sustain themselves through narratives which affirm their underlying assumptions regarding the nature of the world. In other words, a relational ontology is a way of understanding the production of meaning. It is a process of classification through interaction in which the relationship between actors produces the meaning and each other.

The performative approach proposed by Lien and Law (2010) looks at the ways in which the process of producing knowledge does not represent the world "as it is", but generates a particular reality. Viewed in this light, the knowledge claims those who position themselves as fishers or scientists can be rethought of as particular performances of relationality, ways of bringing particular worlds, or natures, or oceans, or even species of fish into being. They are configurations of what their respective adherents believe to be possible in the world and describe

[20]Neis *et al*'s (1999) work looked at the possibility of interviewing local fishers in Newfoundland in order to derive quantitative data from them for use in stock assessment models in an early bid to explore ways of integrate fishers' knowledges with stock assessment science.

how things are according to their way of being in and interacting with the world at that time. Working from this position, hierarchies of knowledge dissolve as the focus of enquiry shifts from people's descriptions of the world, presented as knowledge, truth or fact, to how what they say about the world comes about through their networks, practices and interactions with the known. Working with a relational ontology allows one to perceive knowledge claims as narratives which go through a series of transformations before being delivered.

Writing on the prospect of working with fishers' knowledges, Stanley & Rice (2003) suggest that it is potentially erroneous to view and work with fishers as mere repositories of data. The authors suggest rather that researchers view fishers as fellow researchers who are skilled in "hypothesis formulation, research design and interpretation" (2003: 1). Citing examples of collaboration between fishers and scientists in British Columbia, Canada the authors demonstrate that the fishers with whom they worked were able to not only engage in scientific research but also formulate research hypotheses and accurately analyze results. Stanley & Rice's (2003) work suggests the value in recognizing fishers as researchers whilst simultaneously demonstrating the possibility of collaboration between scientists and other expert groups on a more level playing field of knowledges. In this work the authors push conventional stereotypes surrounding fishers' knowledges and practices and demonstrate that there are a range of distinct convergences between the ways in which they and scientists conduct research and work in the marine environment. Whilst this work points to possible nodes of convergence between the knowledges of fishers and scientists in Canada, in the South African context with an EAF slated for implementation later in 2012, there is still much work to be done in engaging fishers and scientists in conversation and ultimately, collaboration. Following Stanley & Rice's (2003) suggestions this chapter identifies moments where the knowledges of fishers and scientists overlap or share common concerns.

The fisher-researcher

A common misconception surrounding fishers suggests that they only think in terms of short-term scales of temporality and localized physical scales. It is assumed that since fishers are generally based in a specific town within a designated coastal fishery zone that they have no need of consideration of knowledge of fisheries or contexts other than their own. It is also expected that since they live from day to day they do not pay much attention to long-term changes. Moreover, their localization and focus on specific commercial species of fish is understood to mean that they are not concerned with thinking at an ecosystem-wide scale. Scientific knowledge on the other hand is held to be engaged in the generation of universal truths and as such

scientific research projects are generally conducted over and come to represent broad spatial and long temporal scales, generally operating at the ecosystem-wide level. In the opening quote of this chapter, Oom Louis refers to noticeably higher than expected average water temperatures in 2004. The quote is lifted out of an interview conducted in mid-2010 in which Oom Louis and I were discussing his observations of climate change and variability. In this conversation, Oom Louis stated with conviction that he had witnessed this warm water phenomenon and was able to provide an account of the month, year and water temperature. Further to this, Oom Louis noted the anomalous nature of this warm water event by remarking that he had witnessed tuna coming into the bay with the water, a fish which he would usually not expect to catch in Stilbaai (and indeed one which his license prohibits him from catching). It is evident that Oom Louis is thinking through a far longer temporal scale than the stereotypes would suggest. He recalls a range of exact temperatures from a period some six years previous. When I mentioned Oom Louis' observations to Prof. Jarre in early 2011, she was able to locate two sea temperature series for the period to which Oom Louis referred. One of these was a broader series relating to the Agulhas bank in the Benguela ecosystem, while the other came from Ystervarkpunt lighthouse, located some 50km to the east of Stilbaai. What was striking about these two temperature series was that the localized temperature anomaly data derived from the nearby Ystervarkpunt monitoring station showed no significant variability in sea temperature over the December period mentioned by Oom Louis, whereas the broader regional scale series indicated a distinctly hotter period, the precise temperature of which – 22^0C to 24^0C correlated precisely with Oom Louis' observations.

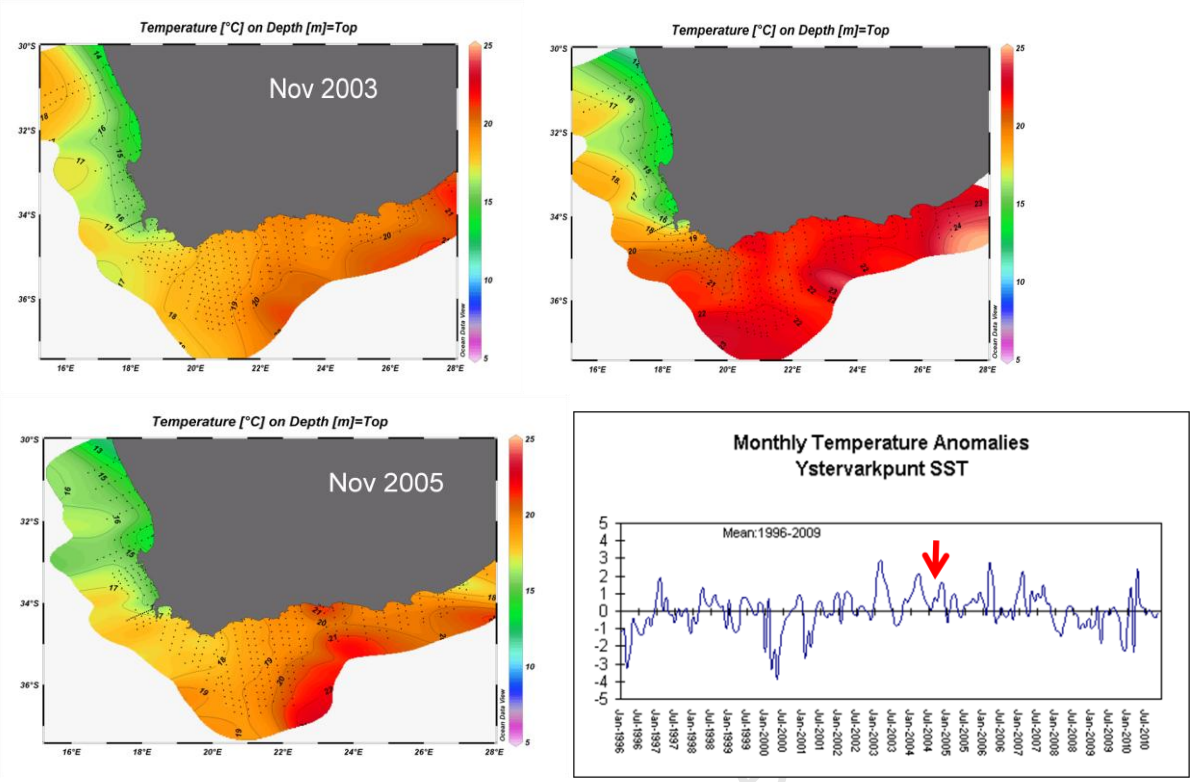

Fig. 5[21] Coastal maps represent Agulhas Bank temperature data. The undated map (top right) is the November 2004 series. The monthly temperature anomaly series from Ystervarkpunt is shown at bottom right. The red arrow indicates the month in question and clearly shows no significant variability.

The Ystervarkpunt series pertains specifically to anomalous sea temperatures yet failed in this case to note any significant anomaly where a local fisher was quick to point one out. Here was a notable moment of convergence and divergence in which local anecdotal data not only displayed a strong correlation with broader regional-scale data but also challenged the findings of a local monitoring station, suggesting that fishers not only take note of water temperature variability but are accurate in their monitoring practices, recording anomalies over a broad temporal scale[22].

[21]Data MCM/DEA (SBS), http://www.cfoo.co.za (Ystervarkpunt)

[22] The reasons for the Ystervarkpunt station's inability to register what was noted in the DAFF series as significantly warm water period are unclear. It has been suggested that the coastal location of the lighthouse means it is unable to accurately record water temperature at depth or a distance from shore, thereby skewing the recordings. A similar phenomenon was reported to me by the Stilbaai Harbour Master who mentioned on occasion that the daily water temperature measurements they are required to take are meaningless given that they are taken in a metre of water inside a harbour. In this conversation the Harbour Master suggested

Drawing on the observations of Oom Louis and the Ystervarkpunt data, Prof. Jarre suggested in a presentation to the Ma-Re BASICS group in September 2011 that such convergences challenged the assumption that fishers think only at the local physical and short-term temporal scales. During this same working group meeting, a question was raised concerning the effective monitoring of local water temperatures along the 3500km of South African coastline. In answer to this, it was suggested that while water temperature and oxygen levels are measured at various locations along the coast, expanding the locales further would be a prohibitively expensive process. Here was an example of scientists hoping to cover a broad spatial scale with data points, yet the networks of capital necessary to achieve such a goal were inaccessible in this case.

Invariably when I went to sea with fishers, we would arrive at a fishing spot and a thermometer would be lowered to different depths. First the top few fathoms of water were measured. Then down to ten fathoms and on to twenty fathoms in order to get a bottom temperature. The following are from my notes on a mid-2010 trip to sea with Boetie:

> Observing localised atmospheric and sea conditions, Boetie reaches inside the small cabin area to grab his thermometer. Unravelling the sturdy gut at its end, he measures off ten fathoms, pulling the string, arms outstretched ten times. He lowers it over the side and waits...one minute, two minutes...
>
> G: is it important to take the temperature?
>
> B: ...because you never know what the fish is doing until you have that range of temperatures. It might be warm on the surface but cold down there – then he doesn't feed. So we must hunt the perfect temperature range.
>
> B: I leave it down there a while so it can take a proper temperature. On the boat it is warmer and as it passes through the upper waters its warm too. So I want it to sit down there at ten fathoms for a time and get a proper reading.
>
> After four or five minutes Boetie raises the thermometer and notes the temperature: 12.3^0C.
>
> B: Ja, that's not good, it's too cold for the Kob and other reef fish and too warm for the Hake to come in to the bay. But I must check the bottom now because you never know.

---

the measurements of the fishers to be far more accurate and indicative of current water temperature at a range of depths.

Boetie measures off an additional ten fathoms and lowers the thermometer down to twenty fathoms. When he pulls it up the small red bar reads 10^0C.

B: Ja, as I thought, too cold for fishing today. But since we're here we'll try anyway – you get lucky sometimes you see...throw a line in and a magic fish that wasn't on the screen bites (chuckling)!

Boetie's approach to measuring temperature has been developed through his years in the Stilbaai fishery from when he was a young child going to sea with his father, Oom Attie, widely respected as one of the most experienced fishermen in the area. Whilst scientific research requires precise and repeatable procedures, my observations and experiences in Stilbaai confirmed that the systems at work in a marine ecosystem are complex, dynamic and variable. The measuring of temperature is a common interest to researchers, be they fishers or scientists, a significant point of convergence. While the methods might differ, the end result is a series of data which can be recorded and used to track changes in seasonal temperature variability in the bay ecosystem. The convergence comes about because the fishers and DAFF researchers are, in this account of nature, concerning themselves with monitoring temperature. While their methods and purposes may differ, the similarity of their interactions results (for example in Oom Loui's case) in a strong correlation of findings.

Given the prohibitive costs of autonomous temperature monitoring devices, which are placed statically in a limited range of habitats and locations, the aptitude of fishers to track movements of fish and take corresponding temperature readings at multiple locations points to the possibility of collaboration and the generation of rich data sets. Whilst they do not generally write down every temperature reading they take, fishers like Oom Louis and Boetie, through their years of monitoring on an almost daily basis, are able to quickly note anomalies. By taking temperature at spots where fish are caught (or not), fishers are able to potentially generate a rich data set which is linked to fish movements and feeding behaviour, pointing to a potential to enrich the data available to an EAF's assessment of ecosystem variability and health.

The researcher-fisher

Spoonbill[23] is an avid and very experienced fisher. He has fished commercially in South Africa's waters and continues to fish recreationally from beach and boat when time and conditions

[23]When discussing, interviewing or presenting the views of senior fishers in Stilbaai, I use the term 'Oom' as a sign of respect. For consistency's sake, Spoonbill's status as both a senior fisher and scientist would dictate that I employ the term 'Oom' before his name. However,

permit. During my research in Stilbaai I was fortunate to spend some time with Spoonbill who always gave generously of his time and insight into the state of South Africa's coastal fisheries. He was also able to provide me with a wealth of data pertaining to the fisheries, particularly the pelagic sector but also with regards to wind and temperature series. I mention this because, whilst he is a fisher, Spoonbill is also senior scientist and marine ecologist. In effect he wears two hats, speaking from the perspective of both fisher and scientist. While operating from within an EAF such a position and experience base would no doubt be considered invaluable, in a stock assessment-based management paradigm the opposite is often true. In response to questions regarding the low productivity of sardine stock east of Cape Agulhas (Jarre *et al*, 2012 forthcoming), Spoonbill, in his official capacity as a scientist, presented a qualitative argument born out of his experience and gut feeling. Spoonbill's experience had taught him that, amongst other reasons, firstly, the water to the east of Cape Agulhas is warmer than that of the west coast, leading to faster metabolism amongst animals, therefore increased respiration and slower growth of fish. Secondly, suggested Spoonbill, the warmer waters are known to be less productive in terms of phytoplankton and zooplankton growth, important food sources for sardines (*ibid.*). Thirdly, owing to the generally clearer waters of the eastern coast, natural predation (and hence mortality) of sardines will be higher given that predators are more readily able to locate and catch them (*ibid.*). These arguments along with some additional points were presented to the stock assessors. Yet whilst grounded in ecology, Spoonbill's suggestions were dismissed outright by the stock assessors who cited the qualitative nature of the data as insufficient evidence because it was "not tested scientifically as insufficient empirical data were available or produced" (Jarre *et al*, 2012: 6). Further to this, according to Spoonbill, he was informed by the stock assessors that they "would not work without numbers". Here was a knowledgeable fisher-scientist who was able, through his years of experience, to provide reasons for the low productivity of sardine stocks. Yet his reliance on feeling and anecdotal data prevented his knowledge from being heard within a stock assessment dominated context.

A number of lessons can be taken from Spoonbill's example. Firstly, to speak of natural science in terms of a monolithic, bounded whole is erroneous – it is clear from Spoonbill's interactions with stock assessors that there were two very different relationalities at play in the interaction. Within the presented unity there exist instances of disunity in which the meaning-making of relations between actors may diverge on significant points. Secondly, to say that a person is a scientist or a fisher absolves one of the responsibility of working fully with the relationality of

since Spoonbill is an English speaker, operating in an English-speaking context, I have elected to refer to him without the appellation 'Oom' in my writing.

that person: marking Spoonbill as a scientist or a fisher in both cases obscures the complexities and overlaps which he embodies as a fisher and scientist and so much more. A person will always be in a different frame dependent upon experience, context and the actors they are interacting with. Likewise to speak of Oom Louis as solely a fisher bounds him to a static category. Oom Louis, as with all other actors, is a becoming. On the quayside he is a businessman, at sea he is fisher, researcher, teacher, skipper and much more. Dependent upon who or what actors interact with and their respective assumptions and contextual experiences, the relationship always produces both meaning and brings particular version of the participants into being in that interactive moment. Operating from a relational ontology, the boundaries of knowledge categories begin to blur and it is not possible to speak of Spoonbill or Oom Louis as a fisher or a scientist as they are always so much more from one interaction to the next.

Thinking spatially

An EAF's emphasis on fishers' knowledges and the interactions between humans and fish in an ecosystem bring with it the need to integrate locally-derived data into a broader scalar framework for effective management. Under the management of DAFF, commercial handline fishers are restricted by a number of regulations and licensing conditions. Two options are open to commercial fishers who wish to secure a license: a standard commercial license of an interim relief permit, issued under the MLRA. These permits are intended to help underprivileged skippers to buy boats and equipment. Once a fisher has secured fishing rights in the form of license or interim permit, an annual license is issued subject to a number of conditions. For example, it is stipulated that holders of a commercial license must be shown to be actively fishing and invest regularly in their boat and equipment. The coastline of South Africa is divided into three management zones, A, B and C for commercial fishers. The west coast as far south as Arniston is placed under Zone A. East of Arniston as far as East London is Zone B and the coastline east of East London as far as the Mozambique boarder is demarcated Zone C. Depending on where a fisher was issued their license, they are limited to operation within that zone.

The handline commercial right is not tied to specific species, so license holders are entitled to catch a range of fish specified under the licensing conditions. However, there are specific additional restrictions for particular species. For example, if a skipper wishes to catch Hake, this is an additional right allocation which must first be applied for. If it is allocated, that fisher and their boat and crew are entitled to target Hake but only in the allotted zone. Whilst they are restricted to their management zones, if fishers wish to change, they need to apply to DAFF to

do so. If, for example, a Stilbaai skipper wishes to target Snoek[24] in Cape Town they do not need a different handline right. However, they need to change from management Zone B (Stilbaai) into management Zone A (West Coast). Transfer of rights between management zones is discouraged but possible in exceptional circumstances. Additionally, Zone A rights are normally fully subscribed, so it is difficult to transfer from to Zone A from Zone B. It would be easy to assume then that under such highly regulated conditions which constrain fishers movements, stipulate species size limits (both maximum and minimum in Kob for example), targetable species and legal zones, fishers would be largely oblivious to other species and locales outside of their specific species allocations and zone. However, my interviews and conversations with fishers revealed that their experience and connections to a range of fisheries challenged the stereotypes discussed earlier in the chapter.

When I met Oom Fish[25] at his house for an interview in early 2010, he was quick to point out that whilst the past month had seen exceptional catches of Kob in Stilbaai, his friend in Cape Infanta, some 100km to the West was also having good fishing. Similarly, Oom Louis described a number of 'connections' – associates or friends, fishermen in different locations within Zones A, B and C with whom he stayed in contact on a regular basis. Invariably, fishers would refer to the state of fishing in another area or zone, whether it was St. Helena on the West Coast, Cape Point in Cape Town, Cape Infanta or Mossel Bay in the Southern Cape or East London on the East Coast.

> Oom Jannie: jus Greg, I tell you, those guys in Cape Town and the Weskus, they're murdering the b***** Snoek down there at the moment man! If I could get this b***** license transferred onto my boat I could be there too. And I know how to catch Snoek, not like these other guys here who have licenses for them. I will go the Cape and you will see - I'll catch a massive amount of that fish I can tell you. I caught them on the Weskus [West Coast] there for years and years.

Without exception, all of the fishers whether originally from Stilbaai or elsewhere, had all worked in different fisheries and fisheries sectors around the South African coastline. Oom Jannie

[24] A bony, fast swimming predatory fish which although found on the east coast they are far more prevalent in the waters off the Cape Peninsula as well as on the west coast of South Africa.
[25] Oom Fish was not introduced in chapter one because, while I spent some time with him in the very beginning of my research, he fished somewhat infrequently during the time I was in Stilbaai and we lost touch during my stay. Nevertheless, he was helpful and open to discussing the fishing and provided me with particular insight into the catch data logs sheets discussed in chapter three.

started out fishing on the Cape Peninsula and West Coast. Sitting with him one afternoon in 2010 he pulled out photo albums and began flipping through pictures:

> OJ: you see, that's from when I had a crayfish vessel on the Weskus…and this is the Pilchard boat of mine in Mossel Bay – we opened the factory there and caught them before anyone else. They were right there in the bay. And you know *ou* Danie Schoeman? I caught shark with them for years in False Bay – we were the first!
>
> Oom Tem: ja, I'll say, I've fished *ou pal* [Afrikaans colloquialism for 'old friend']. I started out here but I was many years on the Weskus catching Snoek. I was a crew member, not a skipper then, and it was hard work but it was good also. Then after a long time in that industry I thought "Tem, you must come home to fish".

When the fishing started to decline in late 2010, Oom Koos and Boetie were quick to travel to the Cape to catch Snoek on the West Coast[26]. They mobilised 'connections' who had informed them of the prodigious catches at that time and organised accommodation and crew. Oom Koos, who had previously skippered as far afield as Durban before the implementation of the new zoning regulations, also travelled to the northern limits of zone B in order to target *Geelbek* in 2011 whilst another local fisher, Anton, organised a quota to catch Tuna for experimental purposes off St. Helena Island.

From small pilchard vessels on the South and East Coasts to large purse-seiners on the West Coast, fish processing plants around the coastline, crayfish deckboats and tiny Snoek 'bakkie' boats on the West Coast to ski boats operating out of East London, Durban and as far afield as Mozambique, it was apparent that the fishers were experienced not just with Stilbaai nor with only particular kind of fishing practice. A very different picture began to emerge of fishers who had worked in a wide range of fisheries under very different circumstances and with a broad array of sea life. Far from concerning themselves with only their local circumstance, it was clear that the fishers were thinking across a range of scales. Moreover, the networks of communication which they engaged in kept them updated with anecdotal data from a range of sources on both coastlines. Their experience and interactions with actors in a range of fisheries and circumstances was also expressed in their thinking about ecosystems, a theme developed further in chapter four. Discussing the range of movements and spawning of Sardines, Oom Jannie declared that the over-catch dumping policies of large commercial trawlers had a direct impact on the behaviour of Sardines:

[26] The range of strategies in which fishers engaged are covered in detail in chapter four.

OJ: No fish want to live in a graveyard and this is why the Westcoast sardine have moved off - *hulle wil nie eers in 'n begrafperk bly nie, verstaan?* [They don't want to live in a graveyard, you understand?]

While Oom Jannie had not witnessed this first-hand, his experience of the sensitivity of fish, dumping of excess and by-catch in Mossel Bay, eye witness accounts by his friends who fish on the West Coast and discussions with his son, a trawler skipper in Mossel Bay, had furnished him with a perception of the knock-on effects of change in a broader ecosystem. When I asked Oom Koos why he believed the Anchovy prevalence had increased noticeably in Stilbaai he suggested a similar line of thought:

OK: look, it's all one big system. It's why the Sardines move from one place to another some years and then not for some years…it's the same with the Anchovy – they will move to a place of less pressure if they have too much fishing in the first place.

Oom Koos's and Oom Jannie's sentiments suggest that they are thinking not only across a broad scale which spans the East and West coasts of South Africa but also in terms of social-ecologies. Both the fishers in this instance recognized the interrelatedness of fishers and fish to the extent that they perceive fish movements as influenced by fishing pressures and the dumping of by-catch[27].

From the discussions and ethnographic data presented above, a picture emerges of a situation in which partial connections (Strathern, 1991) and potential points of convergence emerge between the knowledges of fishers and fisheries scientists. Whilst fishers are certainly concerned with local circumstance, they also demonstrate knowledge of a range of different locations, fisheries and contexts, a perspective more in line with scientific research. In the example of water temperature recording, it emerged that both fishers and scientists are concerned with monitoring water temperature. Albeit that they conduct these measurements for different reasons, the fact that both groups share this research objective indicates a point of convergence where methods and perspectives overlap.

Variability

Oom Jannie: you know, I don't believe this whole climate change thing is really affecting us... here anyway. I mean, if the climate was changing then surely the *stroom* (currents)

[27] This sense of interrelatedness and notions of fishers' social-ecological relationalities are covered in greater detail in chapter four.

would be changing as well!? But they're still exactly the same as they always have been for the forty or more years I've been fishing around here. Just before – maybe a day or so – the Easterly winds blow, the current moves towards the west and then the same just before a Westerly wind comes, the currents flow to the east. It's always been this way…

...the winds haven't changed but they're different now…because you see, in the past, we would get the winds blowing earlier in the year – say from beginning August the South Easter would start to blow. Now it's later, end September of such, and it blows for a *helse* (hell of a) long time. It's still blowing here now every week since September last year, so we get much, much more South East winds now than we did four maybe five years ago.

At first Oom Jannie's seemingly contradictory statements puzzled and concerned me. I had after all, in line with the BASICS Project's goals, come to Stilbaai to conduct research with fishers into their knowledge of fish and fishing in the context of climate change and/or variability. Here was a deeply experienced fisherman telling me that he did not see any indication of climate change but on the other hand was quick to add that he was witnessing a change in wind patterns. Upon re-reading this interview, however, it dawned upon me that what Oom Jannie was referencing in this account was an increase in variability within the expected norm of the fishing season. Oom Jannie's observations of increasingly variability (in this case the wind patterns) revealed a convergence with the observations of science. A core goal of Ma-Re's BASICS project is to recognise and work with the knowledge of fishers in the context of increasing climatic and other variability in the marine ecosystem.

Oom Tem was also adamant that he had observed what he saw as a profound shift in the weather pattern as evidenced in the timing and duration of the fishing season. For Oom Tem, however, the variability in weather was connected to a noticeable variance in the feeding and expected seasonal behaviour/prevalence of Kob in the bay:

Oom Tem: ...I have been at sea now for the past thirty five years – and the most of that time was in Stilbaai. And say now for the past thirty yrs or so we worked in the summer and in the winter we brought the boats in and worked on them or did other jobs because there was no fish – it came in the summer. But now the past three, four years there has been a big change – you go to sea – I mean last year the guys caught something like three hundred kilo's, five hundred kilos a boat in July, August time.

Greg: wow, in the middle of the winter!?

OT: we were usually tied up in that time – we call it *vasgemaak* – for three months! We didn't go to sea because there was no fish in the winter and the weather was wrong. But now…here around May month, from the beginning of May month the fish began to disappear but now for the past while not. And now the guys still catch at this time of the year – I mean look, last week (1st week of June) the guys caught three hundred, four hundred, five hundred kilos a boat! They should have caught nothing, nothing. Before five years ago you would have said it was madness to go out in winter but now…and I must say it is a change because we never had anything at this time – the winter was hard and you had to seek work elsewhere – most of the guys worked in the building trade which is tough at this time too as there is a lot of rain and not much building happening but for three months they had to make ends meet. But now, say before 2002, we caught Stokvis[28] – there was so much that you didn't concentrate on Kob because there wasn't much in any case. Now you maybe catch one or two Stokvis per trip if you're lucky and the rest is all Kob. There was no Kob, just Stokvis. And now for the last four or five years there has been no Stokvis and the Kob is here. Very good. So much so that the price has actually dropped from thirty rand (per kg) to twenty rand! If it carries on like this it will go even lower, you understand? So what you have now is a situation in which we can now fish until December – say now from September, through October, November, December – ja, that's when we get the strong South East winds that come. There are lots of winds that blow but when you come to the sea in the day, you catch fish! You get say for a week of two weeks on top of each other when you catch, every day. Then maybe you will get a day when you won't. Then again after that you will catch fish!

Look here, in those days we caught fish and talked about the catch in terms of *Bakke.* Now we don't talk in terms of bakke anymore, we talk about tonnes of fish. And you don't hear a guy say anymore "we had 10 bakke, 12bakke", you say "we had one point two tonnes, one point three tonnes, one point five tonnes" and that's not just one boat hey, that's four boats, five boats each and the rest also got maybe half a tonne and so on. Everyone catches fish! Everyone catches pretty much the same amounts relative to their boat and crew size you understand?

[28] Stockfish refers to Hake, a coldwater fish usually caught in the bay when sub-surface temperatures drop below 10°C for a prolonged period.

Oom Jannie's and Oom Tem's observations referenced a series of variances in the expected, acceptable pattern of variability within the Stilbaai fishery. As evidenced in these conversations and a later interview with Oom Louis, fishers perceive a series of natural cycles which repeat themselves in different time frames, bringing warmer and colder years and with them, different fish which favour the particular set of conditions. Moreover, within these cycles they expect a degree of variability. However there is an expectation implicit in the statements, that whilst variability and cyclic events are the expected norm, these occur with a fair degree of predictability. However, it became clear over this period of time through my interviews and observations that the variability observed in wind directions and water temperatures were outside of the variability and cycle expected by fishers. Something was clearly different according to them, a sentiment which correlates with observations by natural scientists around the world.

In the Ma-Re BASICS project, a small group under the guidance of Prof. Jarre, is working on correlations between wind patterns and oceanic upwelling. The fishers' references to variability in wind patterns suggest another notable point of convergence, particularly because both groups recognize long-term time series as important. Moreover, recognition of variability and long-term cyclic shifts are also common to both perspectives. One possible collaborative project which might emerge from these convergences could investigate whether winds and upwelling correspond to what fishers might call a 'Kob period' (which the fishers relate to a period of warmer water upwards of 14^0C and good variation in the winds between South Easterly and South Westerly) or a 'Hake period' (which, according to Oom Louis and Oom Koos, are present in the bay when the water a few fathoms from the surface is around 10^0C or lower for a few weeks). Given their interest in regular, accurate temperature monitoring and the fishers' observations of variability this is one convergence worth investigating further.

Conclusion

This chapter introduced a number of convergences, partial connections (Strathern, 1991) or overlaps in the ways in which fishers and scientists perceive and work in marine ecosystems. Introducing a relational approach to working with knowledges, I argued that working with these is a means of better understanding how fishers and scientists enact particular versions of the world. Moreover, I argued that this perspective allows one to see the interconnections and overlaps between which exist between networks and that adherence to strict distinctions between knowledges mask these. As such, a relational approach reveals that the knowledges of fishers and scientists knowledges are not completely separate, nor are they homogenous wholes. Whilst they may adhere to different paradigms of research, the points of commonality and convergence

suggest that they also share points of outlook. The examples of water temperature monitoring and Spoonbill's knowledge claims speak to the ways in which boundaries are blurred when a performative outlook is employed: looking beyond the final descriptions of knowledge to the networks in which they originate renders the processes visible. In both examples, the expected roles of fisher and scientist blur: a fisher accurately conducts methodological water temperature monitoring while a researcher derives data from his experience as a fisher.

Where an EAF looks to foster collaboration and conversation, I have shown that a range of convergences of research, monitoring and practice such as ocean water temperature monitoring, tracking wind and temperature variability and fish movements exist. Rather than being common to discrete groups, I have shown that knowledges and processes often overlap, show similarities and emerge from broad interconnected networks. In particular, the observations and tracking of variability in wind patterns and sea temperature and the links of these to fish movements and prevalence in the bay fishery point to a possible collaborative project between Ma-Re BASICS and Stilbaai fishers.

Chapter Three

Enactments, disconcertments and dialogues

> "Rather than being governed by logic and method, modernity's drive for order conceals its messy, contingent, unplanned and arational character. If we wish to rethink the way we produce knowledge and the forms of knowledge we value, we need to recognise, even celebrate, its unplanned and messy nature"
>
> - Turnbull, 2000: 1

The previous chapter introduced a relational approach to working with knowledges. In this chapter I develop the approach further. Working with Stengers (2005) suggestion to 'slow down' the process of research and Turnbull's (2009: 1) assertions that knowledge is "performative and emergent" I examine the interactions, networks and practices through which knowledge-in-formation is shaped into knowledge claims and static descriptions of fact. Rather than aiming to reach a judgment about knowledge, a relational ontology provides the possibility of working

respectfully with knowledges without relying upon comparative hierarchies or bounded definitions.

In this chapter I follow these sentiments: slowing down to develop my approach further I explore two enactments of Kob, tracing the 'artful deletions' (Law, 2004) that go into the practices that produce knowledge claims. I suggest that relationalities imbue both convergences and divergences. Writing with particular reference to the latter, I move beyond comparing different perspectives or narratives, focusing instead on practices and enactments. I argue that different ways of relating to the world bring different versions of actors into being. Following Turnbull (2000), I suggest that there is not one overarching universal knowledge (science), but rather a range of different knowledges which emerge form relationalities - ethics of interacting with other actors which inform particular accounts of nature, produced and given meaning through those interactions. Via the analytical tool of enactment (Mol, 2002; Lien & Law, 2010), I trace some of the means through which messiness and complexity are smoothed out in narratives of knowledge as fact (Law, 2004b). The term 'enactment' is borrowed from Mol (2002: vii), who takes it to mean the way in which an actor "attunes to, interacts with, and shapes its objects in its various and varied practices" and is a mutual process of becoming in which both parties in an interaction create each other and derive meaning from the interaction[29]. I argue that all knowledges are contingent, emergent, messy and complex assemblages and suggest that notions of access to objective universal truth and fact are self-authorizing narratives which have emerged from within particular accounts of the world that have come to dominate modernist discourse. The objective of this chapter, following Stengers (2008: 42), is "to expose, not denounce but try make perceptible, the "working forces" the modern territory shelters" in a bid to provide a more symmetrical anthropology of knowledge.

In the work on performance and enactment by Lien and Law (2010), Mol (2002) and Law (2004) and are to be found a series of analytical tools for reanimating static descriptions of fact, tracing the trajectories along which knowledges are created and the networks amongst which these comes to be presented as descriptions of reality. In their (2010) work, Lien and Law focus their

[29] Mol's (2002) *The Body Multiple* traces the ways in which different contexts and interactive ways of relating bring different variations of the same thing into being. In the case of her fieldwork, the thing in question is atherosclerosis in the human body. Doctors and pathologists see and interact to atherosclerosis differently from one another (Mol, 2002) and their assumptions and perceptions are such that they come to think, speak and act towards the same human body such they enact multiple versions of the same disease. Similarly in Stilbaai, the fishers and scientists accounts of nature speak about the same fish – Kob – in the same environment, yet enact different versions in their assumptions, interactions, performances and narratives of Kob. Thus the Kob is done multiply - a Kob Multiple.

attentions on commercially farmed Norwegian salmon and attempt to identify and trace the ways in which salmon is 'done' (Verran, 2001) or performed in context. In effect Lien & Law recognize that salmon is generally performed in official accounts as (an) '*is*' - a universally true fact. That is, salmon is presented to the world by various interests, in this particular example a group of natural scientists, in a manner which portrays them as a statically defined, singular entity which is always the same – immutably true - for all people in all contexts. For the authors, "scientific classifications don't simply describe, but are also *performative*: that is, that they are productive of and help to shape and condition the world" (Lien & Law, 2010: 4 emphasis in original). So to describe or say what a fish *is*, obscures what really goes on in the production of the final description, and the interactions between humans and fish – the imaginings, performances and presentations that go into 'doing' fish over and over. The final description of the fish, following Lien and Law (*ibid.*) is derived from a series of processes whereby the complex, messy entities are simplified, with certain aspects accentuated and others eliminated or altered in the final version which comes to represent all of that species. In other words, "scientific classification", write Lien & Law "does salmon in a way that seeks to transcend the specificities of time and space…(and) has the effect of universalising knowledge" (Verran 2002 in Lien & Law 2010: 4), obscuring the complex of spatial, temporal, social, economic, ecological, relational and political (to name but a few) contexts in which descriptions and enactments emerge. It is thus rendered a clearly defined universally true, *singular* entity, a positivist representation of its entire species, unquestionably discrete – an 'is'. Usually this representative is followed by a list of descriptive characteristics which also serve to obscure the background goings on in which a particular version of the fish is being performed. The process of universalizing knowledge masks the relational assumptions of the narrator. So the fish is interacted with and enacted (Lien & Law, 2010) in a particular way depending on the account of nature – the emergent way in which an actor perceives the world.

In order to initiate the discussion I introduce two descriptions of the fish Kob, one from Stilbaai fishers and the other from an official state science description[30, 31]. Following these

[30]The time constraints of my programme of study meant that I was able to work in only limited stretches with Spoonbill although our time spent together in Stilbaai was very productive. Aside from Spoonbill, I spent time working with scientists and senior EAF scientists from UCT as well as taking part in a number of Ma-Re BASICS working group meetings at which DAFF, fishing industry and UCT scientists were present. Since written accounts of science are the final performed knowledge claim of countless hours of methodological procedures and 'artful

examples I open a discussion concerning the ways in which fishers and DAFF scientists are enacting Kob multiples (Mol, 2002). Following Turnbull's (2009) sentiments regarding the performative nature of knowledge, I examine the performances in which knowledges emerge and argue that these are characterized by a series of "artful deletions" (Law, 2004: 88) which transform received knowledge into dislocated 'fact'. The intention in doing so is to show that all knowledges are messy and complex and that they boundaries between them are arbitrary constructions which, once we begin to trace the networks, interactions and practices in which they emerge, begin to unravel. In the context of 'endemic inequality' (van Sittert 2002) which characterises the South African commercial fisheries such a move is necessary to push paradigms.

Later in the chapter I return once again to the examples of Kob multiples supplied by the fishers and DAFF. Here I focus on the sense of disconcertment which arises when the relationalities of experts are placed in dialogue such as might occur in an EAF context. Whilst there is a degree of tactic agreement around what constitutes Kob, it is clear from the two examples provided that there is a tension between the Kob which fishers and scientists are working with. Drawing on the work of Helen Verran (2011 forthcoming) in particular, I conclude the chapter with a discussion of the importance of acknowledging and working with disconcertment and difference

---

deletions', I have elected to work with these and track backwards. In this way I tackle the issue of performance from both ends – in the field of production by fishers and in written form in which DAFF's knowledge claims are disseminated for publics. I believe that such an approach remains empirically robust as it provides distinct counterpoints and defined strategies and philosophies of engagement with the Kob-multiple.

[31] In this work, when I refer to DAFF, I am referring not to a whole but rather to a complex series of translations by myself and fishers regarding the ways in which DAFF shows itself to fishers and the ways in which these men in turn perceive a unified regulatory body. There were many examples given to me by fishers of exemplary work and policy decisions carried out by individual members of DAFF and for the purposes of this dissertation I employ the label DAFF merely to refer to the overall picture that fishers performed of this government entity (and how they it acting towards them). Again, this is a highly complex network of interrelations and as such the label does not do justice to the complexity but is necessary for reasons of brevity.

as powerful generative events (Whatmore, 2009) rather than the stumbling blocks to communication they are often taken to be.

Kob multiples

In order to render the working forces perceptible I turn now to two examples, the first from Stilbaai fishers and the second from MCM/DAFF. In these examples, I show how the relationalities of DAFF and the fishers enact different versions of the same actor dependent on their account of the world.The previous few months had witnessed exceptionally high catches of Kob in the bay and the fishers were in high spirits. There was talk amongst some of the fishers of their being the 'Kob Kings' owing to the unprecedentedly large and consistent catches. The few days of South Easter – an onshore wind which is an important part of the wind-water-fish cycle (but not conducive to fishing in Stilbaai when it is blowing) – were a welcome respite for myself and the fishers. For them it was a time to relax and take stock, perform running repairs to body, mind and boat. For me it was an excuse to conduct interviews in the relaxed comfort of the fishermen's homes, away from the harsh elements and working environment where talking was often difficult.

I arrived at Oom Koos' house just before 10am. Various boats, motors, trailers, tow-vehicles and a small freezer truck stood parked around the front and back of the house in various states of repair. The large white double storey home was bustling with movement when I arrived, two domestic workers going about their work so busily that they seemed to not even notice me as I stepped over the threshold and into the lounge. The lounge served as an entrance to the home and I knocked on the door announcing my arrival. Oom Koos turned round in his seated position at his desk, and, beaming at me over his glasses extended a massive calloused hand to envelope mine in a firm, friendly handshake. As he gestured to a couch and told me to sit, Oom Koos informed me that he had invited his friend and fellow skipper Oom Louis to join our conversation. I was here to talk about the Kob and both Oom Koos and Oom Louis were happy to do so. The discussion below picks up approximately twenty minutes into our conversation:

Greg: how many types of Kob are there?

Oom Koos: there's about three, four…five

G: that you catch here?

OK: ja, that you catch here, that is different from each other.

Oom Louis: there's seven different species of Kob. The only one that you don't get here definitely is the Snapper Salmon that you get in Durban.

OK: but we catch the square-tail also here!

G: so the main ones I know of are the Dusky, the mini-Kob, the Square Tail and the Silver…

OK: ja, but the Silver Kob, neh, the Silver Kob – there's more sub-species of Silver Kob – there's not only one. There's one with the long tail, the one with the funny fins – I showed the researchers the other day – what the difference is – there's a seven kilo fish, his tail is like that (broad), there's the other seven kilo fish and his tail is like that (thin, flat) – there's a *hell* of a difference between the fins – it's a different species, neh. And then there's one of the fish where his head is small, and his body is fat –

OL: - and then the other one with that rounded nose –

OK: - ja, his top of his mouth is shorter than the bottom of his mouth.

OL: now they, if you look when the one's got a thick tail and the other a thinner tail, for the same size fish, they will, for the fun of it – not the fun, to get the knowledge – they will open both, see whether its male, whether its female – and you do get females with different bodies, males with different bodies. So it's definitely different species.

G: But are you catching them all together?

OK & OL: together ja, together!

OK: but some times of the year, that short fish –

OL: - the thick one –

OK: - the thick one, yes, is at a certain time of the year, I think its September, October, we catch plenty, plenty, plenty of it.

OL: you know where you get that is in Namibia as well.

OK: really?

OL: it's different!

OK: scientists don't class it differently but it's different.

OL: ja but to me it's still a Kob and a Kob is a Kob *ou broer*.

OK: (laughing) But we as fishermen see that as another species – we *know* it's another species and its fighting more than the other species of Kob when it's on the line. That shorter fish is much stronger, much, much stronger than the other Kobs. Much, much, much, much stronger! And I show that to Lloyd the other day, I said "look here, can you see the difference?" and he said yes, he can see the difference…but when you get to the harbour, neh, the inspector doesn't want to know it and the factory guy, he doesn't care either. You have a Kob and for them it is a Silver Kob and that is so.

OL: ja, he doesn't care because he gets his same price. Look if he turned around and said it was something else –

OK: - or if we said it was something else –

OL: ja, if we said it was something else, we and him would get a different price. And probably not a better one, you understand? So we must look and speak about it to each other and leave it at that.

OK: but that factory guy, he knows it's different, he sees it every day – a different shaped fish that's not a Dusky but that he sells as a Silver but clearly isn't a Silver.

As a second example of Kob, I turn now to an official description provided by state science. In a weighty tome released in 2001 by the Department of Environmental Affairs and Tourism (DEAT) entitled the *Coastcare Fact Sheet Series*, government scientists and "specialists" set out to

document, for public dissemination, elements of South Africa's marine ecosystems and coastline considered important. Included in the Fact Sheet is an introduction to various species including a number of fish. In section 3, entitled "Coastal and Marine Life – Animals: Vertebrates – Fishes", is a subsection, 3C, dedicated over two pages to 'Kob'. A single colour picture of what we are told is a 'Snapper Kob' is shown at the bottom of the page. The description starts with an account of how many species of Kob are found on the South African coastline ("about nine"). It then proceeds with a description of what Kob *is*: under different headings such as 'Breeding Habits', 'Feeding Habits', 'Life Cycle' and highlighted section covering 'Commercial Importance' the reader is presented with a very neat, uniform version of Kob – what can be expected of it, where to find it, how it operates and so forth. The account describes *all* Kob as having "a coppery sheen…fairly robust with an elongate body and a rounded tail fin" and it continues, stating that "various Kob species are superficially very similar, making it difficult for non-scientists to distinguish between them".

What emerges from the two accounts presented above are two very different knowledge claims which at times contradict one another. Two networks of actors narrate their knowledge and research in the same environment featuring the same actor – Kob. Yet their descriptions clearly reference two different interactions with the fish. Through the actor Kob, it is possible to witness the narratives of two worldviews emerging and being played out in the same environment. In the knowledge claims of official state science, Kob is a clearly defined, universalized fact, dislocated in time and space which, whilst knowable for scientists is "difficult for non-scientists to distinguish" (Coast Care Fact Sheet, 2001). The narrative suggests that the version of Kob presented in the Fact Sheet is true for all Kob. In Oom Koos and Oom Louis' version of Kob, the definition is not as clear. They identify both officially-recognised and classified species such as 'Silver Kob', and 'Snapper Salmon' but also talk about sub-species, a point developed later in this chapter. Their descriptions, rather than being about a singular Kob, speak of heterogeneity, complexity, multiplicity and many sub-species. Rather than being universalized and removed from context, their narrative speaks of identifying the fish through interaction when they are fighting the line. This ready identification of multiple sub-species directly challenges the Fact Sheet's assertions that non-scientists struggle to identify Kob species.

The Fact Sheet is performative of a particular version of Kob (Lien & Law, 2010). In its description Kob is done as an unambiguously known scientifically recognised category – the salient features and facts pertaining to Kob are neatly presented. The account is worded such that the reader receives what appear to be a host of facts which describe what Kob *is*. It is the

textual description, following Lien & Law (2010) which masks what is at stake: where the Fact Sheet describes what Kob *is*, it is in fact acting, *doing* a particular version of Kob (Verran, 2001). That is, where details are presented as truth and facts, these condition public perceptions of Kob in a particular way. While it appears a static, unquestionably factual, universally true description, the official version presents Kob in an official, authorative account. That this account includes certain details and excludes others is never in question. The Fact Sheet account is thus in effect an action, an ongoing a performance of the fish and in this way "the text has less to do with accurate description than with their *enactment*...in a particular way" (Lien & Law 2010 emphasis in original). The text, as a finalized presentation, does not represent to readers the processes of refining and smoothing which went into this one representation. So Kob is done here in a specific light but the processes behind this are not presented.

How is that different versions of Kob are enacted, performed into being? Where the official DAFF government science version is concerned, text plays an integral role. Following Lien and Law (2010), text is a universalizing force which transcends the confines of space and time, performing itself as factual regardless of where it is read. In reality, it is confined to the pages of the Fact Sheet and based upon research conducted in limited localities, transported to an office and written up by a handful of people. The universalising discourse which the text employs frees it of this context and transforms itself into an acceptably true account (Lien & Law, 2010) of what Kob is. In effect, Kob has been 'done' (Verran, 2001) by the Fact Sheet in a particular way in which the processes which went into this enactment and the dislocation of this from the specificities of time and space are not present in the final account. The account would look very different indeed if it stated that Kob were many and varied, comprised of many sub-species readily identified by fishers and that the research upon which the article is based was conducted at a handful of locations around the South African coastline and the final account included a synthesis of various papers regarding Kob. This would of necessity imply a messiness and complexity to the process which the account of nature in state science does not allow for. In the knowledge claims above, two versions of Kob emerge. The different versions emerge through the interactions between two different sets of interactions between actors, the results of which are the bringing into being of two Kob, two accounts of nature and two performances of knowledge. The relationship of DAFF to Kob brings about singular, universalized being whereas the Ooms interactions bring about messy, multiple beings which are knowable through interaction but are difficult to define. It is these relationalities' predispositions to see certain things in certain ways which here perform themselves in their particular ways of relating to the world (and thus Kob).

Nature-culture dualism

I have argued that to speak of bounded categories of scientists and fishers is impossible. Moreover, there are many shades of science and therefore to speak in terms of a unified monolithic, homogenous scientific knowledge is erroneous. It is, however, important to understand how this particular relational engagement came about in modernist ontology. How and why it is that natural science has come to occupy a privileged position which seeks to provide such authorative claims to know and hold sole access to universal truth and fact. Even the name of the information file, *Fact Sheet,* suggests this sense of authority. In the discussion that follows I provide a critique of the nature-culture dualism and show how its' development was linked to the development of modernism and secular science.

Some 250 years ago, following Agyrou (2004; 2005) during the time of the Enlightenment, an ontological distinction arose in European between 'nature' – the perceived domain of animals, plants, land- and seascape – and 'culture' – the domain of human civilization, action, logic and thought. Key here is the conceptual binary: without thinking about the possibility of transcendence, the shift would not be possible. Following Williams (1972: 154 in Ingold, 2000: 63), "nature has to be thought of…as separate from man" before humans are able to exercise any control or intervention over it. Before the advent of widespread domestication of animals and plants, humans dwelt as constituents of nature, in that they were no more able to control it than it them (Ingold, 2000: 62). Intervening in natural processes (Williams, 1972: 154 in Ingold, 2000: 63 & 64) resulted in a breakdown of the symmetrical relationships between themselves and their fellow plant and animal neighbours. Previously, humans had occupied an ambiguous space – sometimes predator, other times prey. The shift to master-dominated resulted in the perception that humanity or 'culture' had transcended 'nature' (Ingold, 2000: 63). With the rationalist separation came an attendant sense of domination and physical distancing. The construction of increasingly advanced structures, tools and clothes all contributed to this sense of physical separation maintained by an adherence to cultural practices. The imperative which arose from this state suggested that only humans possessed culture and that in order to preserve their dominance of all other life forms, they should maintain a physical and ontological separation or risk a return to the 'original state'.

With this concern over maintaining boundaries as the right and destiny of humankind (Ingold, 2000: 61), Europeans increasingly came to separate themselves mentally and physically from "…an intractable domain of utility and danger…(which) was to be mastered, tamed brought under man's control…" (ibid.). In order to maintain the separation, nature had to be actively

controlled through human culture leading to what Escobar (2008: 120) refers to as a "coloniality of nature". This sense of nature being outside of the realm of humans has come to represent a core principle of modernity (Escobar, 2008). In the case of fisheries management, for example, the anthropocentric nature of the dualism maintains itself through a reliance on a naturalized attribution of agency to humans. In other words, humans alone are said to have agency whilst animals are acted upon by humans (Lien & Law, 2011)[32], leading Nelson Maldonado-Torres (2008: 3) to state that modernity is done as "a paradigm of war…a way of conceiving humanity, knowledge and social relations that privileges conflict or *polemos*". In the context of South African fisheries management still dominated by a stock assessment science, this statement rings particularly true: in the 1960's, a model of pilchard stock assessment was developed by a military "engineer-scientist", Johannes Lochner, who had previously worked for the South African government on "Rocket Research and Development" (van Sittert, 2010: 2-3).

During the time of the Enlightenment, following Latour (2004a: 10) Science[33] with a capital 'S' emerged as distinguished from the sciences. "Science", argues Latour (ibid.) is "the politicization of the sciences through epistemology in order to render ordinary political life impotent through the threat of an incontestable nature". In this way, Science became a political vehicle by its very claims to be politically inert (Latour, 2004b). Via its foundational methods and tenets - objectivity, repeatable hypothesis-based methodology and a dispassionate access to 'reality' – Science has come to enact an image of itself as the sole discipline and methodology able to access 'pure truths' and 'objective reality' of nature. One of the most powerful prevailing consequences of this image is the performed ability of scientists alone to traverse unchallenged between the (performed) absolute and discrete realms of society and nature, accessing nature objectively and returning with 'truths' to the extent that "nature becomes knowable through the intermediary of the sciences; it has been transformed through networks of instruments; it is defined through the interventions of professions, disciplines and protocols; it is distributed via databases…" (Latour, 2004a: 4). For Latour then, a monolithic notion of science has come to stand as mediator between culture/society and nature/environment, the self-appointed and authorized guardian of modernity, sole representative, filter and law-giver for both sides. Latour's insight into the power of science to represent itself as solely able to access universal objective truth is valuable in my project and in certain instances. For example where a stock

[32] This point is discussed in greater detail in the following chapter.

[33] The intention of this critique is to demonstrate the constructed performance which goes into naturalising the nature-culture dualism. My project seeks to move beyond deconstructionist critiques which assume a homogenous, unified science towards finding means for working respectfully and meaningfully with knowledges. For this reason, where it is necessary to speak of a particular science's knowledge, I refer to the group according to the project or paradigm of thought they are engaged in (for example EAF scientists or government science). I am well aware, as discussed in chapter two, that these labels in themselves smooth out the messiness of working in science and scientists as people are constantly engaged in wearing many 'hats' as it were.

assessment-type science claims authority through performances of objective methodology, if one follows Latour's (2004a) and Lien and Law's (2010) logic these claims fall short of their goal since they are an enactment, an affirming performance of their account of reality. Likewise, my fieldwork experience has shown me that the performance of scientific unity narrates an account of the nature of the world. As Spoonbill demonstrated in chapter two, there are different sciences, not one monolithic science as Latour suggests (though the image remains and maintains its authority in many instances). Thus to speak of science in terms of a homogenous, unified knowledge is erroneous at best.

Uncovering the messiness of knowledges

There is an underlying assumption, implicit in modernity's reliance on representations of authorative scientific knowledge to inform decisions pertaining to environmental issues, that it is possible to know the world by studying it intently and submitting to it in order to divine purely objective truths or facts about reality which are universal, unambiguous and unbiased. Working with knowledges from a relational perspective however, the claims to represent universal truths of nature fall short in that a focus on the networks and practices of scientific knowledge reveal that the 'facts' are themselves performances of a particular account of the world and thus no more or less valid than any other ontology which concerns itself with understanding and explaining the world. Following Law (2004: 19) "it is wrong to imagine that nature somehow impresses its reality directly on those who study it if they just set aside their own biases". Scientists, after all, are people with beliefs, practices and habits - relationalities. They are people who operate instruments and machines and work tirelessly to produce and document accounts of reality. For Turnbull (2000: 209), "science...is basically social because it is as much driven by the need for consensus and convention as it is by logic and method".

The drive to create and maintain universal intellectual consensus is central to the project of modernism, whereby alternative knowledges are embedded yet unacknowledged within the networks which enact standardized versions of universal reality leading Turnbull (2000: 213) to state:

> "The concept of the individual as a rational actor that is now so basic to Western ways of thought is not derived from first principles, but rather arose in conjunction with the development of modern science...While the notion of the rational actor, unconstrained by circumstance or authority and moved only by logic and evidence, has become embedded in our legal, economic and scientific presuppositions, such an idealised conception is at variance with our lived reality both at the societal and the individual level".

This is not to say that all individuals are irrational or illogical but rather that the ways in which humans perform and practice knowledge are emergent, contingent, complex and circumstantial. To suggest the existence of a universal truth and claim access to that truth is a performance; a representation that make claims to represent fact. Law (2004) contends that the success of modernity lies in its ability to convince people that its descriptions accurately account for observed phenomena without bias. In the DAFF Fact Sheet account of Kob, for example, the complexities of knowledge-in-creation are deleted from the final narrative. Much of the 'artful deletion' is accomplished through the use of 'inscription devices' (Law 2004). These include "any item or apparatus or particular configuration of such items which can transform a material substance into a figure or a diagram which is directly useable" (Latour, 1986: 51 in Law 2004). The subtle influence of inscription devices lies in their ability to direct focus onto the final, smoothed and simplified product away from the complex interactions, material processes and practices which go into creating it. One such example of an inscription device is the DAFF catch log sheet which all commercial handline fishers are mandated to fill in monthly[34]. The fishers with whom I worked all produced their catch data logs for me at some stage. The catch logs are mandatorily submitted to DAFF on an annual basis and the regulatory body levies fishers according to their catches. The sheets are printed on A4 paper with nine columns, representing fish types (note, not species - the sheet is not all that specific).Each column is split into with twelve rows representing months. At the end of each month the skipper is required to fill out the total catch weight for each fish type (not species) in kilograms. The categories are very broad: if a fisher catches a Red Steenbras or a Red Roman it goes under the column simply marked 'Reds'. Any Kob is filled in under the heading 'Kob'. Regular submission of properly filled out data sheets is important in support of applications to renew annual licenses.

[34] For a detailed investigation into the use of catch data log sheets by South African state science, see Tarryn-Anne Anderson's 2011 dissertation *Tracking the Movements of Fish: Skippers Logbooks and Marine Knowledges in Fisheries Management.*

In an interview with the harbour master of Stilbaai, I was told that the intention behind the data sheets is to keep track of changes in the prevalence of different fish in the fishery on monthly and annual scales. Yet the process serves as much more than this: in filling out fish as numbers in the table fishers are performing a process of enumeration on behalf of DAFF and the complex are rendered simplified numerical representatives. The log sheet thus serves as a primary inscription device. Anderson's (2011) work has shown that log sheets, once submitted to MCM, become part of a series of interconnected networks which absorb certain aspects of the log, ignore others and spread selected pieces of information into other networks so that they might be used, for example, in the processes of predictive modelling or stock assessment.

Yet while they are required to fill out the log sheets, it is clear that the fishers' accounts of nature enact a different Kob. They recognise a different being and interact with Kob such that an alternative meaning and fish emerge to that of DAFF. Their interactive frame surfaces certain things dependent upon context. When any of the skippers arrive at the harbor and pull the boat out of the water, if there are fish onboard they tow the boat directly to the Viking Fishing factory located on the quayside and begin to offload their catch. It is here that a critical step of transformation takes place. The following is taken from my notes following a trip to sea in mid-2010:

> Returning to the harbour with Oom Koos, we have made a good haul of Kob, slightly over 800 kilograms by his estimate. Arriving at the quayside, we winch the boat up onto the trailer and tow her over to the Viking Fishing factory where the buyer, Willie, is waiting next to the scales. As the crew begin offloading the *bakke* (large plastic containers) of fish, the process begins: at sea, Oom Koos had shown me some of the characteristics of different sub-species of Silver Kob – the different fin, tail, head and body types. Opening some of them up, he showed me that these were both males and females and that there were indeed distinct differences between the sub-species, even though these swam together. Now, however, as Willie draws closer and the fish come to the scale, the different species of Kob we had identified at sea quickly and seamlessly became one – Silver Kob. It is a game, a performance for one another by fisher and buyer. As every fish is taken from the boat a length and weight measure are taken. Nothing else seems to matter. Individual characteristics are unimportant - in fact I get the sense that Oom Koos would rather not discuss these while Wille is around. The different individuals are thus transformed in a moment, becoming numbers. Then, once all of their number had been tallied, they became a single whole – the catch for the day,

> represented in kilograms and currency and later to be filled in on the log sheet which Oom Koos will submit to MCM/DAFF at year end.

Upon arriving at the quayside and pulling the boat out of the water, Oom Koos now related to Kob differently, seeing them no longer as interesting individuals but as a numbers. It was a relationality into which Oom Koos entered tacitly with Willie in which both agreed to a description of Silver Kob in line with a Linnean classification of what Kob *is*. On the boat, Oom Koos had been quick to point out differences in sub-species of Kob but outside the factory an altogether different account of nature again took place in Oom Koos's interaction with Willie. Now, Oom Koos' enactment and knowledge claim about the fish shifted – in order to sell the fish to the factory the multiple sub-species of Kob were referred to by one name - Silver Kob – thus becoming and becoming recognized as a unified entity. This shift was characterized by a seeming detachment from the fish, which were being thrown from the boat into waiting plastic *bakke*. The individual characteristics that had mattered at sea were no longer important in the relationship. Willie's compliance with this enactment of Silver Kob was also important in securing a price for the catch and together the fisher and the buyer engaged in a process of transforming fish into figures. In so doing the complexities observed at sea – the individual subjective characteristics such as nose, tail and body shape – were now of no importance, smoothed over and translated into object via number, an artful deletion of characteristics which transformed the fish. Later that evening while writing up the day's experience I noted:

> Perhaps it was just my perception of them or the sun and water reflecting off of their skin, but when we were at sea the Kob, although dead, had still seemed lively. Now they appeared grey and waxen, bereft of their individual characteristics, flung unceremoniously as objects through the air. Suddenly they were lifeless numbers…one…two…thirty…forty five…I could almost see the fish being transformed from subjects as they were tossed off the boat and landed with a dull wet thud as an object in the *bakke*.

In effect, the process of creating a number from fish represented a change in the relationship between fisher and fish and the fish's entry into another part of the network, entering into new relationships with other sets of actors. The numbers generated in the fishery enter into networks of resale, consumption, research and management, moving through processes which work with and shape them into accounts of reality. In this way the end of the fish's interactions with fishers and their translation into numbers marks an entry into new networks in which they are further enacted. Lien and Law (2010: 7) argue that "the inscription of a number in a notebook serves as

a first point of making them real". In other words where management, research and the sale of fish are concerned, the creation of a number is a means of quantifying the existence of a thing. The day's total catch weight would be added to the month total for Kob which in turn would be written down by Oom Koos on his catch log sheet and submitted to DAFF at the end of the year. At this point it would serve a range of purposes within DAFF research and management as well as informing future stock models in government's regulation of the country's commercial fisheries. The individuality and conditions of each fish and its capture are omitted at this stage. There is no space available to talk about different species or sub-species, water conditions, location, wind, currents, bait or fish behaviour. The log sheet simplifies and expedites data capture, severing ties between fishers and fish and the time-space in which they interacted. Only the month's total catch of the fish type is entered in each corresponding column and row. In this way, the messiness of the story of the catch is transformed, retold as simple representative numbers in a log. The number comes to represent all of the fish – they have become universalized in a series of digits which now represent them. The complex, multiple, dynamic, unpredictable, sought after are, through this simple process of enumeration, rendered knowable, quantified, simple, predictable, singular, ready for entry into a stock assessment model or levy accounting sheet for next season's licensing purposes.

Enumeration

Why are numbers so important in the catch logs above all else? For Latour (1999), the process of enumeration is a key component in the methodological process of creating scientific knowledge, ensuring repeatability of results. By attaching numbers to things and following delineated methodologies of observation and reporting, it is possible to at once simplify or obscure some features and focus on others (Latour, 1999). The process of silencing some elements and magnifying others is known as translation in Actor Network Theory. By transforming the complexities of observed phenomena into numbers, the complex is rendered simple, knowable, objectified and fit for purpose. Enumeration is perhaps one of the most powerful tools available in maintaining a conceptual separation between nature and culture in that it serves as a third party which mediates and translates between the observations of researchers and the final narrative of findings, thereby keeping the acknowledgement of multiplicity and messiness to a minimum and transforming natural subjects into seemingly objective numbers. Moreover, numbers sever ties with place thereby rendering the final product universalized and bereft of the full complexity of contextual contingence.

In the context of state management of fisheries, numbers serve a range of purposes, informing stock assessments, predictive models of marine ecosystems which in turn impact on policy and regulations. Critically, enumeration is characteristic of a particular account of nature in which fish are accountable and distinguishable from other actors. Enumeration enables certain characteristics of an actor to be surfaced and known. Working with local people in the Kumaon region of the Indian middle-Himalayas, Agrawal (2005) describes how a process of statecraft systematically described and categorised forest land, ascribing ownership rights whilst physically and metaphorically demarcating the landscape into enumerated subjects and spaces ripe for harvest. Agrawal goes on to suggest (2005: 61 – 62) that where states take interest in controlling perceived resources, devices such as "numerical tables, summary figures and statistical relationships" are used to transform and replace subjective relations, rendering them susceptible to control. These numbers are important within the frame of modernity: 'natural resources' must be identified and controlled, thereby entering into networks of capital and enumeration is a neat way of simplifying complexity.

Numbers are often used in conjunction with maps in order to designate and control locations in that they allow for numbers to be superimposed over space. Maps allow people to lift out certain things, see them in particular ways and speak with authority and certainty about a space (Latour, 1999). In South Africa, where a stock assessment paradigm dominates, the coastline is mapped out into three management zones for commercial fishers as detailed previously. Regular stock assessments derived from numerical data and surveys allow DAFF researchers to track changes in fish populationsand the biomass. Numerical data is quintessential in a stock assessment science according to stock assessor Doug Butterworth (1999: 1). In a lecture entitled *Taking Stock: Science and Fisheries Management Entering the New Millennium*, discussing the concept of 'sustainable utilisation' of fish populations, Butterworth suggests that "fisheries management is about numbers – what size of catch will be sustainable? – and mathematics is needed to provide the numerical answer which that question requires" (1999: 1).

The need to simplify: explicit 'translation' in an EAF

Ommer and team(2007: 70-71) have suggested that in the face of calls for more inclusive management programmes which seek to work holistically with the health of an ecosystem and local people, a science-based management programme is limited by its reliance on numbers to assess trends in the composition of catches and the mortality rates of species. The simplification or narrowing of the field of vision, in effect a 'tunnel vision' of the world (or rather aspects thereof), renders infinitely complex phenomena simple and calculable yet simplification is a

necessary step in fisheries management. Writing on the process of interdisciplinary modelling for an EAF, Starfield and Jarre (2011) suggest that in order to formulate predictive models of the world, there is a need to simplify some of the complexity in order to focus attention on specific areas of inquiry deemed important for the model. Such an approach explicitly acknowledges complexity and uncertainty and documents these, but also recognizes that in order to generate effective management recommendations, particularly where multiple issues and worldviews are at stake, it is not viable to model all of the complexities of a social-ecological system. Rather, working with local people and researchers in interdisciplinary collaboration, the approach posits that clear objectives and boundaries of the model may be derived by deciding from the outset the intended scope of the model and key issues these people wish to address. What is left out of the final model are noted (Starfield & Jarre, 2011: 108) as important "assumptions, suppositions or preferences" which are not included because they are deemed beyond the objectives of the model. So rather than simplifying a range of complex data, these are kept intact and noted but only some are chosen as important for inclusion in the particular model. In this way, many models can be generated rather than a single whole which might potentially smooth data. Moreover, the approach works with quantitative and qualitative data, drawing on local anecdotes and narratives. The question of who decides what these objectives are in the model is critical and in response to this the approach seeks to overcome biases in decision making by working with local people and interdisciplinary researchers to incorporate a range of views.

Challenging the traditional approach to building ecosystem models in which modellers take pains to represent each facet of the processes involved and amend the model as they go, Starfield and Jarre (2011) suggest that a rapid prototyping approach points the way to more adaptive models which are potentially better suited to work with variabilities and complexities. Rapid prototyped models of the world are purposefully built and tested quickly rather than being constructed and tweaked slowly over time. They are 'lean' (Starfield & Jarre, 2011) in that they work with few inputs, explicitly noting those data which are left out. Rapidly building and testing the model allows for participants to quickly receive feedback on their inputs and address any issues which may emerge, thereby seeking to achieve accountability, inclusiveness and adaptive flexibility in the model. As I have argued thus far, knowledges are complex, fluid, sometimes intertwined and other times divergent. Given the primacy of models in the fisheries management paradigms, including stock assessment and EAF, and the need to balance complexity with real-world concerns in systems characterized by fast change and variability, an adaptable, fluid approach such as that proposed by Starfield and Jarre (2011) suggests a way of negotiating the need for

models to meet management objectives whilst inclusively addressing the needs of local people as well as the complexities of knowledges and variable circumstances.

Disconcertment and Dialogue

I have argued thus far that knowledges are far more complex, messy assemblages of research, experience, context and personality which don't fit into bounded categories of 'research' and 'experience' since relationalities embody both in a seamless flow. Anderson (2011) argues that to categorise knowledge as 'research based' or 'experience based' is not useful because the process of assembling any knowledge relies on both experience and research(as evidenced by Oom Louis and Spoonbill in chapter two). Yet in debates around the knowledges of fishers and scientists, the former are most often cast in terms of anecdote and experience, whereas the latter are portrayed as operating from within a research-based paradigm. In the accounts of Kob introduced earlier in the chapter there were some notable divergences. There remains a tension within these examples which speaks to the moments in which the knowledges of experts operating with different accounts of nature and relationality are brought into contact. A moment of unease arises in which each claims authority and legitimacy for its knowledge.

Latour (2004a) has suggested that in a negotiation between divergent perspectives it is often unlikely that either side knows what the other believes is being contested. As much as there are clearly a number of partial connections (Strathern, 1991) and overlaps between the knowledges of fishers and marine scientists, the relationship could be characterised in terms of a series of what Verran (2011 forthcoming) describes as 'epistemic disconcertments'. These are moments of unease and discord where the knowledge claims of expert scome into contact in what both feel is their 'home turf', revealing divergent ways of perceiving, receiving and being in the world. Ommer and Team (2007) in the *Coasts Under Stress* Project, explored in detail, the "structural mismatches" or disconnects which occur in contested spaces where the knowledges of scientists and fishers met. For Ommer and Team (*ibid.*), such disconnects may hamper communication as they silence some voices in relation to the dominance of others. In what follows, I briefly consider the possibilities which emerge when the knowledges of fishers and scientists come into contact and ponder whether the disconcertments which arise from this intersection may result in generative dialogue (Verran, 2011 forthcoming) rather than the expected breakdown in communications. Latour (2004a) and Stengers (2005) suggest respectively that the knowledge economy of the sciences enact a set of ontological principles which guide and shape scientific discourse and action, informing policy in their desire for reproducibility of results and transparency, promoting a homogenous set of methodologies which largely constrain the ability

of science to react timeously to, for example, changes in ecosystem variables. Fishers' knowledges and relationality on the other hand, are characterised as adaptive, flexible, contextually-specific and dynamic (Stanley & Rice 2003; Haggan *et al* 2007; Neis *et al* 1999). The question thus becomes: how to go about working with differences and disconcertments in ways which are respectful to the knowledges of all involved parties without privileging one form over another? How might this be done so that it might be viewed by all involved parties as generative, something to be worked with and encouraged, rather than something which divides and maintains hierarchical structures?

Writing on an interaction between Yolngu Aboriginal Australians and Australian environmental scientists, Verran discusses a moment of 'epistemic disconcertment' – "a moment of existential panic" (2011: 74) between two experts discussing the relatedness of two plant species. Collecting two sticks from what are classified in the Linnean system as two different tree species, a senior Yolgnu man suggested to the assembled scientists that these were in fact the same thing, being in a relationship of grandparent and grandchild. A moment of disconcertment arose as a scientist, drawing on his knowledge of Linnean taxonomy and plant botany, tried to demonstrate that the two were in fact not related. Eventually, the awkwardness of the situation eased when the scientist provided an allegory to explain away the disconcertment. However, Verran warns that the use of allegory as a 'soothing balm' risks cutting off the possibility of what she refers to as "generative tensions" (2011: 75 forthcoming), the ability of a situation of disconcertment to force invested parties to invent new ways of working with each other and their knowledges. The use of allegory explains away the position of others in familiar terms – enacting a translation on their worldview without actually resolving difference (*ibid.*), thereby leaving imbalances in knowledge positions unchanged. In Verran's proposition, the tensions which arise from moments of disconcertment are positive because they challenge people to come to new understandings of one another's knowledge. Where allegory is used to explain away differences in perspective, this then allows those from the different camps to remain unchallenged in their own epistemic position. Verran's suggestion is to foster unease with a series of epistemic questions[35] which in turn will force participants to confront their differences as well as look within their own positions. In the context of an EAF, in which a multitude of disciplines, objectives and knowledges are brought together in close working contact, Verran's suggestions are of great significance. If participants are to work meaningfully and respectfully with knowledges and the often divergent perspectives that attend these, it is important to work with difference generatively or else risk marginalizing certain positions through the use of allegory.

[35] A list of these questions is included by Verran in this work (2011: 82 forthcoming).

In the disconcertment presented at the start of this chapter, Oom Louis and Oom Koos speak of sub-species of Silver Kob not recognized by DAFF scientists or the Linnean system of biological classification. In the conversation, the Ooms initially speak in terms of common names recognized in theLinneansystem, used by DAFF and the Fact Sheet. However once they have discussed these species briefly, the picture begins to change. Where they were speaking in terms which resonated with an official scientific version of Kob, the fishersbegin to speak from their own experience in which they have come to recognize a range of what they refer to as "sub-species" of Kob not recognized by marine biologists. The means by which they recognise and categorise these sub-speciesare markedly different from the means scholarly taxonomists would employ within a Linnean system.The sub-species are identified by a range of characteristics including long tail and 'funny' fins; broad tail; thin, flat tail; small head and fat body; rounded nose with protruding lower jaw with the fishers agreeing on naturalness of these sub-species classifications to the extent that they are able to finish each other's descriptions. They catch these species together with what they identify as Silver Kob (in Linnean terms) but at certain times of the year the "thick one" comes in droves and is identified by its strength on the line when hooked.

Writing on the migration and stock structure of cod in the Northern Gulf of St. Lawrence, Murray *et al* (2008) found that in working with local fishers' in conjunction with scientists, while a more nuanced map of cod population structure and their movements was produced, neither group had been in procession of a complete understanding of these prior to the exercise. Conducting research with local fishers, argue the authors *(ibid.*), presents the potential to augment scientific data with higher local resolution, suggesting the prospect of identifying local cod populations. Working with fishers and scientists in Gilbert Bay in Southern Labrador, Wroblewski (2000) explains how scientists, working with data supplied by local fishers, were able to conduct a taxonomic study which revealed a genetically distinct population of Cod which warranted separate management. Oom Louis' and Oom Koos' identification of sub-species of Kob points to a possible collaborative project in Stilbaai in which fishers and scientists might explore the fishers' relational engagements and identification with a view to identifying a possible genetically distinct local Kob population. Even if sub-species in the Linnean sense may not be identified (i.e. in contrast to the Gilbert Bay example), a further worthwhile collaboration might explore the circumstances in which it may be of advantage to use the fisher's relationality and classificatory system rather than the Linnean one without carrying out translations (i.e. using allegory) between these two relational 'taxonomies'. This suggestion is in line with Verran's (2011, forthcoming) example in which a Yolngu account of nature, attendant classification of

species and the bush firing practices which emanated from this resulted in a higher species diversity in the Linnean sense than resulted from conventional scientific firing practices In this instance, translation of one relationality into another weakens the original efficacy, necessitating working through these knowledges along the lines suggested by Verran (2011 forthcoming) above, pushing points rather than explaining each other away.

In order to place the knowledges in dialogue and hold this in good faith (Verran, 2011), it is necessary to recognize that where these touch, differences and divergences may arise. Where relational engagements with the world display nuances which may exceed, challenge and disrupt the other's science, classification and ways of thinking about and relating to fish, these are moments which must be worked with generatively rather than being perceived as inhibiting collaboration. It is only then that new understandings of each position can be reached and further to this, new collaborative knowledge may emerge. Working with relationalities and Verran's (2011 forthcoming) proposal to foster unease in order to generate new understanding, suggest new means of building collaboration and respectful dialogue in understanding social ecological dynamics. Acknowledging difference and working with it in good faith demonstrates a commitment on the part of all those involved in the disagreement to debate and learn from one another, rather than resorting to allegory to resolve an issue through compromise. There is, as always, a risk in working with difference and disconcertment, particularly where Verran's (2011) suggestions are applied. Fostering disconcertment risks setting up two opposing groups, resulting in a state which Povinelli (2001) refers to as 'incommensurability', "a state in which two phenomena (or worlds) cannot be compared by a third without producing serious distortion". However, 'incommensurability' is only a risk where the disconcertments that flow from relationalities are so strong that they disallow the possibility of convergence. As I have shown in the preceding chapter, there are a range of commonalities and overlaps in the relational engagements of fishers and scientists (both stock assessment and EAF adherents). Whilst there are disconcertments which arise from the narrative representations of Kob presented in this chapter, both speak about the identity and identification of Kob, evidencing a partial connection in a shared subject matter and overlapping question of taxonomy.

Conclusion

A performative approach suggests that speaking or writing about what Kob *is,* is in effect a paradox: the act belies the fact that knowledge is produced, not in the "face-to-face confrontation of a mind with an object", but is rather "the result of a chain of transformations" (Roepstorff, 2000: 167). In effect then, claims to knowledge that represents Kob "as it is" are

affirmations of a particular knower's underlying assumptions and account of the world. I sought to reintroduce some of the messiness, complexity and fluidity back into the narratives by tracing the assumptions and practices through which relationalities interact with Kob, enacting their knowledge for themselves and others. I have suggested that, dependent on context and audience, people engage in processes of 'artful deletion' in enacting their knowledge for others. Discussing the process of enumeration I suggested that in the interests of communicating knowledges, too often the simplified versions which are performed for others miscommunicate because they simplify and dislocate knowledge from the time-space in which it was received, without making explicit the assumptions, translations and processes through which it enters new networks and relationalities, and is enacted to others.

Drawing on Stengers' (2005) work, Whatmore (2009) suggests that where publics are engaged in interrogating knowledge and regulatory practice, the controversies and contestations which arise should be viewed 'generative events', moments from which new understandings and strategies might emerge. The concept of generative events suggests that research shift focus away from the desire to generate conclusions based on questions of right and wrong and address concerns over how people enact different worldviews. Reframing disconcertment, difference and contestations of knowledge as generative pushes knowledge debates beyond static classifications, value judgments and hierarchies of knowledge by looking to new ways of working productively and respectfully with the potential which lies in difference. Rather than perpetuating a sense of *polemos,* Lien and Law's (2010), Verran's (2011 forthcoming) and Whatmore's (2009) work points to means of examining and tracing more closely the ways in which knowledges emerge in contingent relations and working through these carefully and respectfully. By slowing down to trace both the ways in which knowledges are constituted through practice and the connections and disconnections between these, it is possible tomake space available to challenge positions in good faith and thereby generate deeper understanding of positions, perceptions and ways of acting in the world.

Chapter four

Ethics, environment(alities), ecologies and relationality

> "The ceremonial worlds of the West…are diminished in the sense that they are not intended to be responsibly true worlds, ones that ring true for everybody's well-being. Nor are they worlds built on the basis of an ethical-epistemological orientation of attentiveness (respect). Moreover, these worlds tend to be built in accordance with epistemologies of domination and control; and it is within these worlds that we propose ethical theories and projects to *counter* domination and control"
>
> - Hester & Cheney, 2001: 32

In the previous chapter, I showed by way of two knowledge claims regarding the same actor, Kob, that there are many natures. There is no single nature of Kob I argued, drawing on the narratives of the knowledge claims to show that these do not represent the world "as it is" but rather are generative of particular realities. In this final chapter I introduce a relationality – an ethical interaction and way of becoming in the world. It is a way of relating to other actors grounded in ethical, economic and ecological concerns but is not limited to these. By way of ethnographic interviews I show how this interactive relationship brings fishers and Kob into being in a form particular way. This relationality is characterized by a flexible adaptive strategy of acting and interacting in the world, one born directly out of interactive relationships with what it knows as a dynamic, continually emergent, physically and behaviourally variable being - Kob. As such it works with changing circumstance and the potential of a situation rather than having a set plan of the world. I suggest that it emerges from the assumptions and experiences of fishers and is constantly adapted to shifting circumstance.

In the context of the impending implementation of an EAF in South Africa's highly contested, politicised and economically-influenced fisheries later this year (2012 as mandated by South Africa's signature to the 2002 WSSD (Shannon *et al*, 2010)), there is a need to balance ecosystem-sustaining objectives with economic and social considerations. The relationality presented here, I suggest, offers an alternative means of thinking about and working with fish which addresses some of these objectives. It is by no means a solution but rather a challenge to conventional forms of relationality to rethink economic, social and ecological interactions, positing a potential way of working meaningfully with these.

By way of introduction I open the chapter with a series of ethnographic interview excerpts and discuss these in relation to key debates and interventions in thinking through nature-cultures in the past 80-odd years. Drawing on the work of von Uexküll (1934) and Willerslev (2004), I discuss a range of ways of thinking about the world(s) which living beings inhabit and in so doing suggest that the relationality that I present, whilst innovative and important, is just one of many grounded in real experiences, contexts and concerns. I suggest that at the centre of these alternatives is a sense of being and becoming in the world, of interacting within, rather than acting upon it in a disengaged way. This shift from ontologies of being and identity to a relational ontology of processing and praxes of doing was discussed in detail in chapter three. In this chapter, I make the step even more explicit, exploring the ways in which a particular account of nature creates a knowing, vibrant, complex and variable Kob through its interactions with them. An important perspectival foundation of this account of nature is the process of "thinking like a fish" in order to locate and catch them. Drawing on the work of Francois Jullien (2004) I suggest that this combination of thinking from the position of fish combined with economic, ecological and ethical concerns represent a strategic means of engaging the potential which emerges from variable circumstances. In this chapter I have elected to give voice to the fishers, allowing them to narrate their account of nature through a series of interviews and conversations.

Towards an ethical ecological relationality

The discourse of sustainability and conservation makes a range of assumptions about local people and knowledge. A common stereotype amongst conservationists and monitors from an environmental evaluation agency with whom I spoke often in Stilbaai holds that commercial handline fishers are oblivious to conservation issues and regulatory guidelines; are bent on exploiting fish populations and hold scant regard for the 'sustainability' of future 'stocks'. The language here is telling and reveals a mismatch: fish are often spoken of in official documents in terms of stocks, resources and numbers. This is the language of stock assessment, which draws on statistical models and methodological research to make future predictions. All too often this management paradigm assumes that fishers focus only on generating maximum income and thus concern themselves only with the present, with little concern for the future and future health of the marine ecosystem. One product of such thinking in conservation and resource management has been the emergence of 'ecosystem services' approaches, an increasingly popular methodology for working with local people living and/or working within contested ecologies. An econo-centric framework, the ecosystem services idea holds that people will only care about something if its economic value is shown to them, the assumption being that people respond to

money over other concerns and will not make provision for future conservation if not economically incentivised. Such a position is wholly anthropocentric in that it assumes that only if something has value to human economy that it is worth something to the ecosystem. As discussed in the introduction to this work, van Sittert's (2002) research has shown a close link between networks of capital and a state science and management structure, a finding in line with Turnbull's (2000) sentiments that the conceptual structure of modernist science (such as a stock assessment paradigm) has emerged in an interdependence with capital. Indeed van Sittert (2002: 295) suggests that the South African fishery today is characterised by "a consolidation of monopoly capital and state control over marine commons". In Stilbaai, for example, the*visvywers* were closed following the implementation of the 1998 MLRA. The fish traps were seen as a tourist draw card by government and were placed within the boundaries of a newly formed Marine Protected Area (MPA). In move typical of an ecosystem services approach, ancestral rights holders were economically incentivized to keep the traps in good repair but prohibited from fishing them. Many of the traps in the area are now in a state of disrepair: without the rights to fish them, Oom Tem explained to me, there was little interest in working the traps.

> Oom Tem: ...we didn't do it for the money, you see? We enjoy fishing. We like to fish...so you tell a man here's the money...for (doing) nothing and he say's "no, I have my pride, you have taken this thing from me that my family built for generations and now it is hollow"...you lose interest, you see?

It is clear from this example that Oom Tem was not swayed by an ecosystem services-type argument. Whilst he and others were offered money to keep the traps in good condition he felt disenfranchised from an ancestrally authorized right. A sense begins to emerge from this interaction that monetary concerns are trumped in value by the desire to work for the right reasons.

One wintry, overcast afternoon in mid-2010 I drove into Melkhoutfontein to visit Oom Tem. When I arrived the skipper was dressed warmly in an ankle-length coat and beanie. Taking a break after a month of fishing with hardly any days off, Oom Tem was relaxed and excited to talk about the prolific Kob catches of the past month. I was interested to know how the Oom felt about the future of Kob fishing in the bay after such a successful season: was this a last hurrah from the Kob or an emergent state of plenty born of the now popular minimum size regulation changes implemented by MCM in 2004?

Oom Tem: Now I would argue, you understand, those times when we caught a lot of fish, here by Oosstene (Eastern Rocks) there wasn't fish. And now those rocks are perhaps two, three kilometers apart. Now the past three, four years where there was never any fish, the guy sits over the part where there was fish at one end of the bank and I sit on the other where there was never anything for years and now I catch fish here and he doesn't catch fish there. I will say that because you didn't work that rock for a while you have left the food to grow there and so after a while, once you have worked off all the food and plants from damage from anchors dragging, the fish will naturally move over to a new, more food-rich environment. That new spot, you see, there haven't been anchors over it which can damage the vegetation and hurt them [Oom Tem used the term "maak seer die plantegroei" – literally to wound or hurt the vegetation and compromise their growth]. So you see if a person has worked too much on the rocks a fish will see and know. He will move on. To better plants, better protection. We know I will suggest to you, that these anchors we are using are bad for the reef and the plants, they hurt them all the time when they become stuck and then you must pull using the motors. Look, would you wish to live in a home where a man has just pulled the roof off and destroyed your vegetable garden with a loud machine? No! The Kob, he is a sensitive creature and we must work with him, not against him. That is the only way to ensure future fishing in this area. I have asked the MCM people to come talk to us about anchors – I have made an anchor that doesn't need the sharp points to hook but nobody up there wants to hear about it.

Greg: so do most of the people fish in the same place at the moment?

OT: ja, on that point and that's why they make those plants sore with the anchors and stuff and the lines. And the pulling with the motors, you hurt that reef badly. It will scar it I am sure. And then that bank for the past five, six, seven years has stood empty. Every so often we check it out to make sure and then the last while it has had fish again – it has repaired and healed itself enough to support life again but now all the boats are over it once more and in a few months or a year or whatever that reef will be without Kob and smaller fish again because the anchors and the noise and the stresses from above will have cleaned it out. This is why we need a better anchor to work with. It is killing our reefs! I am now the only one using this different anchor out of the whole fleet and it works. It doesn't hook fast like the others. It comes loose fast and doesn't get stuck. I can pull it by hand instead of having to use the motors. And when we pull it up there is

never any plant life on it, you understand? You can go to a place only so long and then with time it will be empty and with a bit more time it will be healed.

I was struck in this conversation by the way in which Oom Tem related to Kob. Rather than a single-species approach, in talking about Kob, Oom Tem's outlook took cognizance of the health of the reef and the plants which colonize it in determining the future presence of fish. Oom Tem's reference to the regular anchors as "killing our reefs" expressed his concern for the health of the reef – a living organism which fishers have a duty to care for. Oom Tem's relationality to Kob is informed by recognition of a complexly interwoven ecosystem. Oom Tem sees Kob as part of a broader ecosystem which includes interaction between humans and fish. Through his interactions with Kob as an element of an ecosystem, he brings a particular account of the world into being; a different nature in which beings are interconnected and nature is inseparable from society. Oom Tem's scale speaks to the local ecosystem, his narrative and way of relating to the fish by accounting for their world (the reef and marine ecosystem) is generative of a particular version of reality. His ecosystem-scale interactions, albeit within the local ecosystem of the bay, converge with an ecosystem science which would work with the entire biophysical realm in order to account for complexity in understanding, modelling and managing a fishery. Both positions assume the interconnectedness of humans and non-humans. Moreover, both assume the interconnectedness within the marine habitat in which if one influences a particular actor in the ecosystem other actors in the network will be affected and react. In Oom Tem's narrative, if one cares for the health of the reef including the plants (which shelter and feed the smaller bait fish), using less damaging anchors and putting less frequent and intense pressure on an area, this will result in a more prosperous fishery because the health of the reef ecosystem is accounted for and actively engaged with.

In the conversation above, it was clear to me that Oom Tem was not referring to the reefs in terms of ownership. Rather he spoke of them as something that he and the other fishers were responsible for safeguarding if they were to work and engage with them. As a whole system, Oom Tem saw that the effects of an anchor dragging over plants would have a profound and lasting impact on the lives of fish – not just the Kob but the small prey fish that live on the reef and attract Kob to these places - and fishers. Having never dived or seen the reefs some 20-40m down, how was Oom Tem able to imagine such a complete and nuanced picture of the Kob's breeding and resting habitat?

Umwelt

Estonian biophilosopher Jakob von Uexküll is remembered for his development of the concept of *umwelt*, the name he gave to describe the perceptual life-world of any given animal (Sagan, D. in von Uexküll , J 1934)[36]. For von Uexküll , *umwelt* is an integral presupposition in coming to understand the social and physical environments which animals and individuals within species inhabit. Von Uexküll 's thesis suggests that these environments are innumerable and form multiple realities within a broader shared Nature. The power of the concept of *umwelt* is its ability to transcend the binaries of subject-object, human-nonhuman by positing that all animals are in fact not passive objects but active subjects which form the centre of their own individual worlds rather than the periphery of ours.

In his (1934) *A Foray Into the Worlds of Animals and Humans,* having made intellectual and physical relational space available to appreciate the existence of multiple animal life worlds von Uexküll takes on the task of seeing into and from the perspective of those who form the centre of these worlds. In this work, von Uexküll outlines a thought experiment in which the reader is encouraged to think from the *umwelt* of an oak tree and those who dwell in, on and around it. For some, the oak is part of their *umwelt*, for others it *is* their *umwelt*. An example of the former is the forester for whom the oak is an object to be measured and assessed for its money earning potential. It is an integral part of this actor's *umwelt* but only one of many. An example of the latter is the Bark beetle, which spends its entire lifecycle under the bark of the tree, the oak is nursery, food, shelter and final resting place. For this beetle, the tree is its entire *umwelt*.

Similarly, when he speaks about the reef having to heal itself in order to support life once more, Oom Tem is referring to part of the *umwelt* of the Kob. There are many reefs and undersea mountains which support marine plant life and offer food and protection to the Kob and the Oom Tem recognizes that since humans damage the home world of Kob by fishing on the reefs and put undue pressure on Kob by overfishing particular spots, careful maintenance of these is vital in ensuring a healthy presence of Kob in the bay. In short the *umwelt* of Kob must be kept healthy and inviting. Having never seen the reefs or an image of them, bar a blue line on a sonar fish finder, Oom Tem enters the *umwelt* of Kob when he interacts with them. His knowledge of

[36]The word *umwelt* is of German origin and is literally translated as "world around". The concept has been taken up by ecologists to speak about environment (biotic and/or abiotic) and notably, in recent discourse on habitat and habitat protection. Whilst these have drawn on von Uexküll's (1934) concept, they have supplemented different terms to replace the word *umwelt*. I have elected to work with the original term in my research in order to explicitly reference von Uexküll's original concept in the full sense he intended.

Kob in this instance emerges from a performative narrative based on his experience of fishing over reefs, pulling up anchors with plant material trapped in them and the resultant perceptions of what the reef might look like.

The strength in working with Uekxull's *umwelt*, I believe, is the ability to begin to think more empathetically about an animal and even take the tentative steps towards thinking from its perspective. Oom Tem has never seen the reefs whose health he is concerned about yet he has formed a detailed picture of them to the extent that he has been able to manufacture an anchor which is less harmful to them. A sense of interconnection and interaction forms part of Oom Tem's narrative. He engages with the *umwelt* reef world of the Kob in order to better understand the fish from its perspective. What is significant in this engagement is that Oom Tem allows himself to be influenced from the fish's perspective and in so doing has fostered for himself a sense of appreciation of what is important in *its* world and ecology. In effect he has aligned himself with Kob in a way which breaks down the relations of domination between subjects and objects, rendering animals once again as equally subjects in their relations with other animals and humans.

A few weeks after the interview with Oom Tem I was at Oom Jannie's house. The conversation turned to notions of change and variability in fishing:

> Oom Jannie: Now also, I can't say why but I can swear it to you, the fish bite differently…in the past, maybe ten years back now, right, you would go out when they were on the bite and for maybe two weeks you would catch fish every day. Maybe a tonne on the first day, then three hundred kilos the next, then six hundred and fifty the next and so on, but you got fish every day for two weeks. Now they come – BAP! – you catch seventy tonnes between fifteen boats in one and a half days *o pal* and then – bap! – they're gone again for a month…and nobody knows where they go to because they're not deeper because the trawlers don't catch them – they're somewhere around here but we don't know where and they just don't want to bite, even if the conditions are perfect. Then they come back again for a short time but they go crazy – you catch them much more quicker today than we used to even ten years back. It's a better quality fish too, much bigger – eight or nine, maybe even ten to twelve kilos always, never bigger or smaller than that – and this is a good fish for us – we get a good price for it because it makes for good eating in the restaurants. Soft flesh I think.

OJ: Also, you see, and this is something I'm really sure about, I will swear it to you and I am certain of this, I will put my reputation on this, the fishes movements have changed. You see there in Mossel Bay we were the first ones to get a commercial trawling license for the small pelagics – to catch pilchards you see. When we started we used to catch them right in the surf! And most of them that we caught were full of roe. They were breeding in the surf and in the harbour close in to shore. There used to be these big balls of sardines that dispersed and then came back again into a tight ball, lots of those balls in and around the harbour! And do you know that island just out there – between that and the shore we used to just sit and catch tonnes of them, maybe four tonnes at a time because we were a small boat and we didn't have a factory in those days so we catch just for the local sales. But they were right there close to land. Now fifteen years later I go back there and the guys from then until now, are catching them thirty kilometers off shore or more, maybe thirty miles. None of them are there anymore like they were. They learnt where we were catching them and they moved on, move away. And that's the same story with this sardine story on the west coast you know…agh man, these guys they are dumping so much from the trawlers…look, when they see a shoal on the sonar they are going for a bigger one even though they know that one they see will fill their nets because they're scared it's not big enough and then they have to reset their nets which is a *helse* [hell of a] job to reset one kilometer of those things with twenty to thirty tonne lead on it! Then they just dump the rest. Man, I can show you where we have been out and from one (ski) boat to the next we are three hundred meters and there is fish all the way in between us. Now if you dump a tonne of fish maybe ten percent floats the rest is like a brick *o pal* it sinks fast to the ocean floor. We drive over that and see sometimes forty tonne dumped by one vessel and its twenty fathoms thick! No fish wants to live in a graveyard and this is why the Westcoast sardine have moved off - *hulle wil nie eers in 'n begrafperk bly nie, verstaan?* [They don't want to live in a graveyard, you understand?]

In this conversation, Oom Jannie was adamant that he had observed changes in the behaviour and movements of fish. What is telling about his recounting of dumping of fish is again an account of the impacts of this behaviour upon the entire ecosystem. The mass death and dumping of sardines is sufficient to drive off not only other sardines but other species of fish since no fish wants to live in a graveyard. The narrative presented here is also interesting because it begins to question the ethical implications of capital as a moral economy of gain. Oom Jannie's sentiments suggest that in maintaining the health of an ecosystem, such a moral economy of gain is untenable because in maximising profits it despoils the ecosystem and drives away fish. In

recognizing what he sees as an unjustifiable tradeoff of profits for reduced ecosystem health, Oom Jannie's relationality implies his integration in a system as a being among many other beings that is not solely or overwhelmingly governed by money

Thinking like fish

Two points of interest arise from the interview excerpt above and both are points which I now wish to elaborate upon: interaction between fishers and fish and the notion of 'thinking like fish' which takes place in these interactions. 'Thinking like a fish' was a phrase which I heard at various times during my fieldwork. Oom Jannie suggested one afternoon at the harbour that "to catch a fish you must think like a fish". In this instance, Oom Jannie was referring to my question regarding his decision to return to the harbour early. He'd answered that the winds and water temperature were slightly off, sufficient, in his experience, to prevent the Kob from biting.

Some months before, I had interviewed Oom Louis and Oom Koos together at Oom Koos's house. The conversation turned to notions of experience:

> Greg: ja, but its' more than that because you've read but you have the experience –
>
> Oom Koos: knowledge!
>
> Oom Louis: yes, now you see it in practice
>
> G: I mean I can have read Strike and all these wonderful books and I've done lots of river fishing and that but and I've caught lots of Duskies (Dusky Kob, a species mostly caught in tidal rivers and estuaries) and that, but I don't have that picture that you do – I can see as you're explaining it to me now – in my mind –
>
> OL: - ask him that's genuine ["vra vir hom dis genuine" i.e. that is exactly the right question]
>
> OK: ja, that is how it works
>
> G: ja, and that's exciting stuff for me, that's the kind of meat of the thing, because you have an understanding of what things look like in a realm where no one else knows, you know, you actually have a picture and a model in your mind –
>
> OL: most people think fish is stupid – fish is not stupid – fish is exceptionally clever – exceptionally clever! You just take the colour of the gut (handline) – with one colour you'll get fish, and with another colour you'll get zilch!

OK: ja, no fish. Especially the green – your strop-line, where your hook is on –

G: so you have to change your line to suit the water colour?

OK: ja, most times, when the fish is on the bottom, then if you catch with green line, strop line, then you will not catch fish. Put a white line on and you will catch it. Sometimes even the hook colour – the silver hook or the – that brown one – especially on hake –

OL: take notice neh, take notice of fish – for thirty years, roughly – you catch Kob for a long time – and it's not always true – the most of the time, if you get fish and you gut it and check what it is – if its males or females. If more of the fish is male, then you know – the big fish is coming – not the big fish – the abundance is coming. Then they come in – its breeding fish. They come and clean up – they come and check the whole place out and then the females come and they are mad – ask him – they take anything!

On numerous occasions with the fishers, we would arrive at a spot only for the skipper cast a quick glance at the water and declare that we would catch nothing. The following is taken from my field notes:

01 July 2010. To sea with Boetie and the crew of Dreamtime. We arrive at the first site some 6km from the harbour (according to the GPS track log) around 7am. As he throttles back the engines to dead slow, Boetie surveys the water and declares that we will catch nothing.

Boetie: nah, there's f*****l here. Doesn't look to me like we'll catch anything other than *vaalhaai* today [Vaalhaai is the local name given to a small species of shark up to 50cm in length. It is considered a nuisance by fishers and is usually released or sometimes clubbed with a stick and thrown overboard[37]].

Greg: how can you tell? We haven't thrown a line or even set anchor. The temperature looks low but not too bad –

B: no its k** fishing today. The South East wind was too strong out here last night. Look at the water colour – its wrong. And the chop on the surface is too rough. If I was a Kob I wouldn't want to eat here today. I'll tell you now they've moved on from here.

[37] Such is the complexity of working with relationalities – the example of *vaalhaai* shows that whilst fishers are concerned with the health of the ecosystem they are not averse to labelling some fish as nuisances and disposing of them.

Perhaps in order to humour me, Boetie and crew members Hondtjies and Henry throw in lines baited with Anchovy. Within a minute the first bite comes and the first fish is hooked.

Henry: bloody *vaalhaai*...you can always tell. Here – feel my line.

Taking his thick nylon line in my fingers I try to feel the characteristics of the fish. The pulsing tug on the line is erratic and strong.

H: you see – *vaalhaai*.

I don't see, can't see. I've fished for most of my life but when a fish takes the bait I struggle to "see" with my fingers and nerves. Sure enough, Henry lands a 40cm long vaalhaai a few seconds later and when Hondtjies' line is pulled taught shortly afterwards, Boetie moves to the front of the boat to begin pulling up the anchor he had just dropped and set.

Boetie: see, *vaalhaai*. They like this water - I could see they were under there when we arrived. They're here when the Kob's not. It's a bad sign of change for us – the fish is moving away.

As I read over the day's notes and reviewed my recordings it was apparent that Boetie had clearly done more in looking at the water surface than simply making an educated guess – he was so sure in his judgment that I was not surprised when only *vaalhaai* were pulled up.

In the three accounts of fish presented above, there is a sense of fishers thinking like fish. Without being able to see them, fishers 'see' fish underwater, operating in their *umwelt*. In Oom Jannie's experience, fish learn and act accordingly, varying their movements and behaviour when they experience discomforting conditions. His performance of fish in this conversation suggests that the changes in the way fish bite, move, and behave are due to their interactions with fishers and the effect of fishing on ecosystem dynamics. For Oom Louis and Oom Koos, Kob is clever and highly reactive, responding differently to different colours of line and even hooks dependent upon water conditions but also the general demeanor of the fish – at certain times they will take any colour. In order to attract the fish to the line they have to experiment with colours and there is a sense of agency on the part of Kob in what Oom Louis says: in this narrative, Kob is clever and as a result of this intelligence will not be fooled into taking the bait unless the line is the right colour to blend in with the water conditions. When we arrived at the chosen spot, Boetie told me that he could "see (that the *vaalhaai*) were under (the water) when we arrived". Yet Boetie hadn't

yet looked at the sonar fish finder. He couldn't possibly see under the water, as choppy as the surface was. The common thread running through these narratives is one of being able to see under water into the world of fish without physically observing it. I was often taken aback by the accuracy with which fishers could predict what fish they would catch and what species and size they had hooked. Certainly these emerge from an embodied knowledge of fish born out of years of experience. Yet chalking this sight up to embodied knowledge answers only half of the question. What practices and processes go into the ability to see beyond the limitations of conventional sight?

Writing on the hunting practices of Yukaghir hunters in Siberia, Willerslev (2004: 629) suggests that common conceptions of animals as responding automatically and instinctually to external stimuli are limited by their anthropocentric perspective. For the Yukaghir, hunting entails taking on a "double perspective" (Willerslev, 2004: 630). This 'double perspective, which Willerslev (*ibid.*) refers to as *mimesis*, is a process whereby the hunter tries to take on and impersonate the perspective of the prey being hunted but remain a human hunter. *Mimesis* is a useful tool in thinking through the ability of fishers to think like fish whilst simultaneously thinking like humans. During my fieldwork I witnessed how fishers were able to seamlessly and largely unconsciously move between worlds and perspectives of humans and fish. From the technological trappings of humanity (Internet, cellphones, GPS, sonar, boats and motors to name but a few) they shifted into the perspective of fish in which Kob were the centre of the *umwelt* in order to decide upon a location, bait, line colour, fishing depth and predict fish movements. For Oom's Koos, Louis and Jannie, fish is clever, adaptive to different fishing pressures and apt to change its behaviour, feeding patterns and movements according to various anthropogenic and environmental factors. Even line and hook colour play an important role in catching fish, suggesting that fish are aware of the presence of the line in the water and in effect will make a choice as to whether or not to take the bait dependent on these seemingly tiny details. The fishers must constantly adapt and think both from human and fish perspectives if they are to make a success of any trip to sea.

Knowing through interaction

The examples presented above suggest that when fishers enter the world of fish (i.e. the seascape), they enter into the *umwelt* of fish and engage in a process of *mimesis*, thinking simultaneously like fish and fishers in order to locate, attract to the line and catch the former. The account of nature I began to pick up on during my time at sea amongst the fishers was based on a sense of knowing fish as fellow 'becomings' through interaction. Then Oom Louis,

for example, refers to Kob as clever and Oom Tem thinks about Kob as members of an entire ecosystem, they do so based on their interactions with fish. In other words, knowing *about* fish as a subject is not what is being done. Rather the fishers' knowledge and understanding of fish is played out as an interaction between knowing subjects on a level playing field. In this relationality, fish are sentient, intelligent beings with their own knowledge of fishers and their behaviour – this is why fishers must constantly revise their strategies, line and hook colours, fishing locations and bait.

In conversation with Oom Louis and Oom Koos in mid-2010, the conversation turned to shark fishing:

> Oom Koos: ...I will go for the shark now – you will see (shark) will increase now.
>
> Oom Louis: As soon as you start to target it now, you will see, it will be there. In the past we had to because there was no Kob, now the fish stocks is getting better, you don't target the shark but in actual fact it seems like its not there –
>
> OK: ja, the people will say "there's no shark". No, there is shark around but because we don't target it the people don't see it so they say it's not there. It is there but invisible kind of so when we decide to make it there if the price is right then it comes.

Oom Koos raises an interesting point in the conversation above: there is a sense that there is no fish without the fisher and no fisher without the fish since it is only when he decides to target shark that they become visible to others. So the fish are made real by entering into the networks of fishers. Once the price of shark becomes high enough there is sufficient incentive to target them and they are made visible, present. In much the same way, the knowledge and existence of Kob is contingent upon a series of ongoing interactions between them and fishers and it is only through these that fishers know them. When Boetie speaks of the strategy of *riem hou* (Discussed later in this chapter) and he talks about the noise of the motors sometimes attracting or repelling the fish, he is describing a series of interactions with the fish – his knowledge of Kob concerns them not as separate objects but as related, interacting subjects - he knows them and they know him only when he and they are interacting, relating to one another, engaged in a sort of courtship dance of predator and prey in which the formed tries to adapt his strategies in order to locate and attract the latter. The messiness inherent within this knowledge is self evident – Kob are constantly changing and adapting and fishers must adapt with them.

Far from the passive, disinterested and objective observer, the fishers know only through these ongoing relationships. As another example, take line and hook colours: Oom's Louis and Koos suggested that these can often play a decisive role in attracting and catching Kob. They have learnt this through interaction and the right line colour changes between and within interactions. They know that this occurs but only know for sure which line colour will work when they are engaged with Kob on the reef, trying to attract them to the bait. They can say for sure that line and hook colour make a difference but cannot dislocate this knowledge from the interactions in which it occurs – only when they are at sea, over a shoal can they say for sure which combination works when the first fish takes the bait. For this reason, all the fishers head out with a range of different line colours and decide on one or another dependant on how the fish interact with it.

Kob in this emergence *is* itself framed as an interaction: just as shark is made visible through the fishers' interactions with it, so too Kob is played out as an interacting being, known in relation to humans. When the fishers speak of Kob, they seldom speak of it outside of a story. Kob is recounted in this way not as an isolated object which can be described, for to describe what Kob is, this relationality demands that the telling be intricately interwoven with a story of what Kob does when humans are working with, pursuing, investigating and investigating it. Rather than describe Kob as the Factsheet does in static terms and physiological characteristics, Oom Koos' and Oom Louis' comments in the preceding chapter speak of physical characteristics...which can be discerned as soon as the fish takes the bait. It is thus not possible in this relational account of nature to describe fish in isolation from fisher, as subject and object, nature and culture. They are intertwined, inseparable and the fish are told through their interactions with the fishers. In other words, where fishers are in interaction with fish, their understanding is utterly conditional on their relations with that thing, not the information they have been told regarding it.

When the fisher approaches the fishing grounds, he begins to enact his knowledge of Kob based on previous interactions. Information is of little consequence to the fisher outside of interaction. He may know all there is to know about the Kob but it will count for little if he does not understand how Kob interact with himself, his lines, anchor, boat and motors. His presence in the world of the Kob is integral to his catching it and an appreciation of the displacements, the changes his presence and interaction in the world of Kob cause are essential if he is to catch Kob successfully. The changes I witnessed in the fishing practices of the fishers in the short time I was in Stilbaai were testament to a complex adaptive system in which fishers and fish are interconnected and related to one another in an adaptive ecosystem. As an example of this, when

fishers concentrate their efforts over one spot for more than a few days, the Kob are likely to move to another location and the fishers modify their behaviour accordingly.

An understanding of underlying processes was a common thread which ran through the anecdotes and narratives of all the fishers with whom I worked. Where Oom Tem talked in terms of the health of the reef and the plants which grow upon it as integral to the health of Kob, Oom Louis was concerned with issues of pollution and trawling which he also saw as damaging the reefs which supported Kob populations. For Oom Koos and Oom Jannie, the presence of Kob was deeply influenced by the prevailing winds and currents and both of these fishers referenced the changes in bait fish as driving factors in the influx of large Kob to the area. A sense thus began to emerge of the ways in which fishers view this complex system of interconnections. The presence of Kob is a function, for these fishers, of myriad interconnected factors all of which are integral to a large, composite, complex system. For the fishers, an understanding of these underlying factors and the broader systemic influences at play is thus vital if one is to successfully locate, attract and catch fish. Kob and knowing them are thus an interrelated complex of variables: there is no Kob without the reef and the plants, the currents, the winds, tides, moon, water temperature, bait fish and the fisher.

Working with potential

"To be (a fisherman) is to live between heaven and hell. You catch well and your family eats…you catch badly and your family starves".

- Boetie, January 2011

Towards last quarter of 2010, the South East winds began to blow. They hardly ceased for two months. The water became cold and the fish scarce. From a time of plenty, the bay fishery entered a dismal period of sporadic and rapidly declining catches. The mood of many of the fishers turned sour. When I spoke to fishers or managed to get to sea with them there was a clear sense that that the good times were a thing of the past and that the imperative now was to deal with the changing circumstances as effectively as possible. Some skippers, particularly the older generation were hesitant about going to sea with prospects so dismal. Ooms Tem, Jannie and Koos did not venture out for the entire month of December for fear of wasting fuel and bait. This was a time when the wide range of strategies for dealing with variability and vulnerability in the fishery were evident all around me.

From the outset of my research, the fishers had discussed what they saw as a noticeable increase in intra-seasonal variability in the wind conditions. Fishers expected the South East wind to blow but only for a few days at a time. After a month of relentless onshore winds, there was talk of something being out of the expected variability. Speaking with Oom Tem, who I happened across as I was leaving the shops one afternoon in early December, the fisher commented "now you can speak of climate change". This notable variance in intra-seasonal wind patterns rendered the sea almost unfishable for months and was attributed in conjunction with various anthropocentric fishing pressures (such as too many handliners over a particular reef, the presence of trawling vessels in the area and the practice of *riem hou* discussed below) as causing a noticeable change in the behavior of Kob. These pressures both within and outside of the fishery led to an extraordinary set of circumstances which placed intense pressures on the livelihoods and strategies of fishers. Options such as the building trade were no longer open[38]. Previous license structures which allowed for more movement and the targeting of a wider range of species were no more, replaced in 2005 by a new system which rendered the vast majority of fishers dependent on one or two main money-making fish species (Kob and Hake) which were never present together. Now, neither fish was present in the bay. As Oom Louis put it during December 2010:

> Oom Louis: ...look, conditions couldn't be any worse...no one will listen to us and we must as usual make our own way in the face of being told what to do...every man must make his way but this is getting b****y difficult to do with the options closing down before you try them.

Variability and vulnerability are clearly hallmarks of the small-scale commercial handline industry. To an extent, experience and knowledge of the fishery allow fishers to make predictions about when, where and what to fish. However with so many complex variables interacting in the fishery it is necessary for fishers to navigate shifting terrain on a regular basis. Where variability increases, for example in the unseasonably long onshore wind spell and the changes in fish behavior and movements, fishers are rendered increasingly vulnerable and must engage in a host of strategies in order to cope. When I first arrived in Stilbaai and engaged with fishers, by all accounts, for the next six months of my research Kob fishing was at a high. Catches and fish

[38] For decades, fishers have worked in the local building industry in the 'off-season' as labourers, plasterers, brick layers and other such artisanal positions. With the global and national economic recession of 2008 the local building industry collapsed with many of the permanent builders, who usually hire off season fishers as itinerant labourers, leaving the area in search of greener pastures.

prices were both high and stable and the fishers were on a good run. However, with the abrupt change in the wind patterns and the disappearance of the bay stocks, old and new vulnerabilities set in. In all, it was clear from my time with the fishers that their livelihoods were determined largely by cycles and vulnerability, which cut through those in often unpredictable ways. In response, the strategies of fishers were varied according to the individual's perceptions, financial resources and family life.

In early 2010 I was with Oom Tem at his house, discussing the prolific Kob catches of the time:

> Oom Tem: It is a natural change this. It has always been so. The West coast was rich in oily fish and now there has been none for a long time but it is coming back I can tell you – I can tell that it is coming back now soon starting with this year. It will. And then it will change again and shift over to somewhere else with another type of fish.
>
> And that is how it wants to go, you understand. And that is why I, in the long run, will tell you I have made a plan. I know for a fact that in the 1980s the Kob was very scarce. And in those times maybe once or twice a year one boat would maybe catch a tonne of Kob. And the rest would catch maybe a hundred kilos a boat. It always goes up and down. And that is why I have got for myself a smaller boat – my other one is a six-man and this new smaller one is a four-man. So I mean you are not always going to catch this type and amount of fish forever here I can tell you that! A tonne a day, even a tonne a week – it's not always going to be that way! In any case it will always change and shift. A smaller boat means my bait costs are less, my petrol is less, my crew payments are less and if the fishing's good I can fill up quickly and be back first to get the good prices for the fish at the factory. And it shifts always, you understand. In those years when we had poor fishing here, the people in Knysna had it good, then Mossel Bay, now us. And it will move on and change in any case. You will see. And now after poor seasons of Snoek, the Cape is getting good Snoek again, do you see? It is all a cycle and it will always shift and change. There will always be fish just different fish in different places. I mean, back in the 80's I worked for a time on the West Coast, in Stompneusbaai. And we would drive there from Saldanha Bay and other people would come up from the Cape. But that's not worth it anymore with the price of things. So now we must wait until it comes again to us instead of driving everywhere in hope – it is too expensive!

Oom Tem had considered his decades of experience on the sea and had determined what he saw as a highly cyclic system, one which he could not fight against but rather had to work with if he

was to make a living from his chosen profession. His strategy relied upon the money that he had earned during the good times to invest into an alternative option so that dependant on prevailing conditions and fish populations he would be assured of flexibility. Buying a smaller boat during a time of prolific catches demonstrated his perception of the cyclic nature of fishing – he was under no delusions and saw the present good times as part of a cycle alternating between prosperity followed by hard times.

Oom Jannie's outlook was characterized by an evolving adaptive strategy to changing circumstance. When we first met, Oom Jannie, somewhat contrary to Oom Tem's tactics, was working on refurbishing a larger boat – his reasoning was that the Kob stocks were moving further offshore and had to be sought out at greater distances – necessitating a larger, safer craft capable of carrying a larger hauls of fish that he expected. When we first met in February of 2010, Oom Jannie was in the process of transferring another fisher's license into his name – the license which enables handline commercials to target Hake and Snoek in the Cape. Oom Jannie was adamant that the good times were part of a larger cycle of boom and bust and that he should be prepared to move wherever fish were to be found. Oom Jannie and I discussed at length what he saw as changes in the behaviour of fish stocks, particularly Kob, in the bay.

In the shorter-term, particularly over the festive period, I was again witness to yet another range of strategies, this time putting the practical knowledge of fishers to work. The holiday revellers had begun to arrive by this time and recreational river and sea boats were all around. It was at this time that Oom Jannie and Oom Koos became engaged in their boat fixing operations:

> Arriving at Oom Koos' large white house I noticed a number of boats and trailers in varying states of disrepair parked on the front and back lawns. Walking around the side of the house to the back I found the Oom in his capacious extended garage, assisted by one of his regular boat crew, ably dismantling the impeller mechanism of an outboard motor.
>
> Oom Koos: Ja boetie, how are you?
>
> Greg: I am well thank you uncle, and you?
>
> OK: well I won't shake your hand because you can see how I am (laughs) – up to my elbows in grease! But at least it is something to do in these times – don't ask me about the fishing, I know you want to – I haven't bothered to go to sea in a month or more now. No, I'm a mechanic these days (chuckles softly and wistfully). At least it pays the

> bills and with the tourist season on these past few weeks I've been able to make a little money – not as much as if I could go to sea and catch good fish but if I did I probably wouldn't catch anything now so…a man must have a plan at all times – something to fall back onto if the work he is doing now does not work out. But this is my plan for now – and if I can't make any money out of fixing other people's boats then I must move away or try to catch more Snoek on the West Coast.

Another line of investigation in which Oom Koos involved himself was the possibility of purchasing the disused Irvine & Johnson (I&J) fish processing factory which stands on the quayside at the harbour. During the boom period, Oom Koos was already proposing to buy the factory as a collective in order to cut out the middlemen and provide a more stable prices structure. Furthermore, he was enthused by what he saw as the prospect of creating more jobs for the families of fishers[39]. As of the time of writing this project has yet to be realised.

Like Oom Koos, Oom Jannie was also engaged in boat-fixing activities at that time but his line focussed more on the painstaking work of fibre-glassing holes in boat hulls. In mid-December 2010 I went to visit Oom Jannie. I was perplexed when I arrived outside his immaculately presented house with its neatly manicured lawn and topiary, to find a large printed sign hanging on the front wall: *Huis te koop. Navrae binne. Tel eienaar.* (House for sale. Enquiries within. Call owner). Walking around the back of the house as was my custom by then, for I knew odds were that the Oom would be hard at work on a boat out back, I spied the Oom and a friend puzzling over a deep crack in an upturned boat hull. After examining the crack with him, Oom Jannie suggested we head inside and talk. It was clear that Oom Jannie had something on his mind and wanted to talk:

> Oom Jannie: Greg, do you know how I can go about getting a permit here to catch crayfish?
>
> Greg: I'm not sure I follow Oom…I thought crayfish wasn't this far south?
>
> OJ: It is I tell you! I have seen it with my own eyes…there was a guy, John Muir (a local diver and spear fisherman), he passed away a few years ago now, he showed me many times huge *kreef* (crayfish) which he caught out there diving. There's plenty out there but

[39] Oom Koos sees the disused factory as an opportunity to empower the fishers and their families. By cutting out the middle-man, setting their own stable prices and processing their own fish, providing jobs for those who don't go to sea, the idea is to create a community-owned and managed fish processing factory which secures jobs within fishing families.

> the scientists don't know it. They laughed at me when I phoned MCM to ask about a permit. They told me there is no crayfish anywhere near here but there is. And I have pots from my days on the West Coast. So I can catch them easily, I know exactly how and where to look, I just need that permit…
>
> You know, a man only needs a small quota of crayfish and he will make good money. I need maybe a five tonne quota and I will be happy[40]. I am not greedy, I only want enough to support myself and my wife and family when the fishing times are difficult you understand? The crayfish doesn't move so far and so fast as the fish do so when the fish aren't biting I could catch crayfish instead…there's lot's out there, plenty to support a small industry I know it, I'm telling you they are here in big enough numbers!

Oom Jannie is an experienced crayfisherman who worked for many years on the West Coast and still owns all the requisite fishing gear. He showed me a small photo album during this conversation, the contents of which documented years of crayfishing experience.

Oom Louis was not ready to give up fishing to pursue another line of work. He told me this when I eventually saw him after more than a month's absence in January 2011:

> Greg: hello uncle, I haven't seen your boat here for a while –
>
> Oom Louis: ja Greg, I've been in Gouritz – we were waiting for the Hake to come in with the cold water. Then we thought the Geelbek might come in again – something has to come. But f****** has come. I tell you, this is the worst fishing since 1976 and that's the truth. But I'm going back up there this afternoon because we've been catching a bit of red fish here and there...but its bloody expensive doing this schlep all the time. Back and forth, renting a room, your food. Maybe it's not worth it but I must take a gamble because nobody else will.

Whereas the older generation of Stilbaai fishers were more prone to trying to make ends meet in the bay area and surrounds before considering moving further afield, younger fishers like Boetie and his friend Anton relied on a strategy of mobility. Over the December period, Boetie made a plan to join a friend's boat in Cape Town as a crew member catching Snoek. At that time the Snoek was exceptionally good in the Cape and Boetie had seized the opportunity to make some money. I caught up with him a few days after he returned in December 2010.

[40] A crayfish quota is currently limited to 1 tonne per year. Oom Jannie last fished for crayfish on the west coast some thirty years ago. At the time the regulations were different and his allusion to a 5 tonne quota suggests that he is not aware of the current quota limits.

Greg: so Boet, how was it in the Cape?

Boetie: good man, very good. Ja I caught a s***load of Snoek in ten days I think it was. The fishing is so good down there now you could go out just about anywhere man and you will catch something. Its like the opposite of here – like we f***** up somehow and we're paying for it. The Kob's moved on to warmer waters and here we are looking like idiots. (MCM) told me to invest in my boat and equipment as part of permit requirements – I did – look where that got me. F***all. So I must go and do these other jobs to pay for my family. Me, I can go without food for a long time – I've done it before. But my son, well he needs school and food every day, you know? I didn't like the Snoek fishing and its f****** hard work but I must do what I must to feed my family and keep a roof over them. I will go back again, especially with my boat if (DAFF) gives me the license change I've requested – Oom Koos has been helping me with that but no reply from them so far – I don't even know if they have the paper work or not – I think I must bribe someone there (laughs).

Throughout the remainder of my time in the fishery, as the Kob catches dwindled and no other significant catches of other species were made in the bay, Boetie continued to rely on a short-term strategy to make ends meet. Where an opening or opportunity presented itself to fish out of Cape Town or Mossel Bay, or even further afield in East London, he would take these as and when they arose.

Another tactic which Boetie and some of the younger skippers initiated at the start of the lean times was a practice known locally in Afrikaans as "riem hou" – literally 'holding the oar'. The practice involves leaving the motors running, in gear with the throttle in the ahead position but at absolute minimum revs. The anchor is purposefully not dropped and the skipper works to keep his boat in position over the shifting shoal below. I was curious to see the practice at work and organised a trip with Boetie to see it in action.

We arrived at the reef and I noted another eight boats present in the area. All but two had left their motors running and had not set an anchor. The small group was tracking slowly with the movements of the shoal of Kob. Boetie sidled up within a metre of his friend Anton's boat and joined his peers in drifting. Within seconds of the first line being thrown overboard the first fish were hooked and for a good half an hour the catch was coming in at a fantastic rate. All too sudden, however, it dropped off and within another five minutes the lines were quiet.

Greg: so Boetie, why the riem hou?

Boetie: agh ja man, it's because the bloody fish move so fast nowdays, understand? It's not like they used to be – on the rock for days. Now it's all fast and they *move* ou pal ['my friend']. They move fast and you must keep over them. Sometimes too, they like the sound of the engines above if they're on low. This way you can stay over them as they move. Otherwise, I tell you – and you have seen it now – you will put an anchor down and as soon as it hits the bottom that fish has moved twenty, thirty, fifty metres away before you even throw in a line. And when you do – there's nothing man. So we must adapt and move with the fish. That's why I say, we are always experimenting and thinking like the fish.

Through my observations and conversation with fishers I began to get a sense of the multiple, complex adaptive strategies which they make use of according to shifting circumstances. Most relied on a particular skill set such as welding or composites molding as a regular substitute in times of poor fishing. Others relied on their fishing skills and travelled in search of work while others still relied on a combination of fishing and odd jobs to make ends meet. It was clear from my interactions with the fishers that they and their families take great strain when the fishing is poor. However, the strategies were efficient enough that, at least in my time there, none of them were forced out of the fishery permanently[41].

Dealing with the downturn of fishing, the narratives of the fishers at this time became characterized by an ability to adapt swiftly to changing circumstances. When the South Easterly winds began to set in and fish shoaling became erratic, fishers observed distinct changes in the feeding and movements of Kob. Within a week, many of the skippers had elected to try their hand at *riem hou* as a strategy for working with variability in Kob behaviour. This is another hallmark of the fisher's relationality – the ability to work with rather than against circumstance. Time and again I witnessed how fishers communicated and sought out fish in loose groupings structured along networks of friendship and trust. In times of fish scarcity, rather than adopting

[41] In early January 2012 I called Oom Jannie and he informed me that he had recently taken as position on a Pilchard boat out of Gansbaai in order to stabilize his income and ensure that he could still fish. "I don't know anything else", he told me. "All I know is the sea and this is where I want to work so I must take this job and I'm happy...if the fishing improves in Stilbaai I'm there by the weekend". This in itself is telling of Oom Jannie's adaptive strategy. In his sixties, Oom Jannie is committed to fishing and is willing to adapt his lifestyle in order to stay on the sea.

a selfish strategy, skippers would inform others of where they had made a catch so that they might benefit. When I asked Oom Koos about this behaviour he replied:

> Oom Koos: there is no way I with my boat can catch out a shoal. So I would rather spread the news so that other guys can catch them too. If they're in the area they must come – we all work together because even if you don't like someone we must be friends at sea because this is not a place to have enemies.

When one considers the range of strategies which emerged during the lean times in the Stilbaai fishery there is seemingly no specific model of strategy. There are overlaps in the strategies (for example repairing boats) but each of the fishers has a slightly different way of going about their business. For example, Oom Koos and Oom Jannie live just a few houses away from one another on the same street and both work on commercial and recreational fishing boats. Oom Jannie concentrates his skills on fibreglassing and fixing trailer axles whereas Oom Koos focuses on mechanical problems such as fixing impeller mechanisms[42] and welding rusted trailers. In this regard, the adaptive strategies of the fishers share a degree of commonality with a notion presented by Francois Jullien in his (2004) work on Chinese thought. In this work, Jullien suggests that relying on the propensity of things rather than constructing and working within or towards an ideal form, is a means of enabling oneself to "detect the factors whose configuration is favourable to the task at hand; instead of setting up a goal for our actions... (or) imposing our plan on the world, we could rely on the potential inherent in the situation" (2004: 16).

Discussing his three sons' involvement in the Stilbaai fishery one afternoon in early 2010, Oom Louis commented:

> Oom Louis: You see Greg, I am learning every day from the fish. I'll tell you I learn all the time from everything and from the fish I catch I learn something every day. You see, what I see a lot – I've got three kids and they fish with me – and they are gathering information. They don't just live, they go through life, they like information, knowledge and they will go "look at this, look at this". For instance once, I lost a piece of Dakron from an electric reel – this you will not believe. And it fell off my vessel while I was working. I thought "oh well, it's ok"…about 2 weeks after that, I was fishing down in the East, about 7 kilometres from there, my middle son Kallie caught a Hake, he said "look

[42] An Impeller is a pump-like component of a marine outboard motor which sucks water into a cooling water jacket surrounding the engine and forces it back out. Due to the corrosive nature of salt water these often disintegrate or become clogged, potentially causing the engine to overheat and seize.

> at this strange thing in this Hake!" that long, about as thick as my finger. I said "let me see it, hell that's strange!?" It was that same piece of Dakron with the gut – it was a *koek* [tangled mess] - and we cut it out. That same exact thing after two weeks, my vessel caught it after 2 weeks and there was millions of hake that day and luckily he opened that one particular fish!? That's why I say they have that knowledge – he opened the guts to see what's in there.

In mid-2010 I met with Oom Louis at his house to discuss the state of the fishery. In this interview, our conversation turned to the ways in which fishers experiment in order to locate and catch Kob:

> Oom Louis: Kob, through evolution, is not a predator – it's being preyed on. And normally in clean water during the day time you will not catch Kob, because it hides in cracks and that. And tonight, you will catch it on the rock. You can ask (Oom Koos), at night you catch it on the rock. And many people have got cross with me – I go off the rock, I fish in the mud – ask him – I get lots of fish in the mud, there where they hide. We know exactly, there's one specific place – they call it "The Dropoff" – then it goes to 60m and here it goes to 30m, at night, sundown you lie here (shallow) – as that fish goes up for half an hour, three quarters of an hour, you get good fish. And then it's gone. It's not gone - they only went up the rock to the top. And during the night you get it on different places on top (of the rock). And tomorrow morning before the sun rises you go lie here (on the edge @ 30m) again and they come –

In discussing his and his sons' interactions with Kob in this particular conversation, Oom Louis was keen to present the research that they do. But the story tells more than research – it is a description of a complex and adaptive strategy of learning in which fishers learn from fish just as fish learn from fishers. In this reciprocal feedback relationship, both actors influence each other's knowledge and behavior. Experimentation and research is part of this learning. *Riem hou*, trying out different anchor designs, changing line colours, cutting open fish and fishing in unconventional spots are just some of the ways in which fishers test theories and hunches. The strategies employed, whether in times of plenty or paucity, suggest an approach to life which is works with circumstance and evolves with the potential of a situation. It is not fatalistic, however, and experimentation and research are an integral part of working with circumstance, seeking out the best means of engaging potential. When fishing was not enough, Oom Jannie took to mending boats and when this also proved insufficient after the recreational boaters left Stilbaai, he sought work in the commercial pilchard trawling fishery of Gansbaai, relying on

experience and contacts gained in that industry some twenty years before. Jullien (2004: 15) suggests that the advantage of working with the potential which emerges from circumstance is that it does without "a world of ideal forms, archetypes, or pure essences that are separate from reality but inform it". In this relationality, nature is a continually emerging, responsive process which finds form in the interactions which take place between various actors in the world, be they human or non-human.

Rather than imposing their own ideal model of universal reality on events, I witnessed time and again how fishers would improvise their actions based on the situation in which they found themselves. When going to sea, there was little planning conducted before hand: aside from checking the weather forecast it was only when we were on the water that a skipper would begin evaluating conditions carefully and decide on a course of action. Even then, if this course did not realise good fishing this was seen as part and parcel of the enterprise and a new location or fishing tactic was adopted. Changing bait, line colour or location as conditions dictated, the fishers allowed themselves to be influenced by and work with the events of the moment. In January 2011, for example, I made a number of trips to sea with Boetie. When we arrived at a particular reef to find (as was becoming the norm at this time) no Kob in the vicinity, Boetie and the crew would check for the presence of other reef fish such as the highly valued 'Red Roman' species.

> Greg: Boet, why the change in bait?
>
> Boetie: no Hondtjies reckons there might be Red Roman on the reef, he says yesterday Oom Koos's guys caught some out here so we'll try for it now quick…

To return to Jullien (2004: 20), "it is from the very evolution of the situation...that he intends to profit". Red Roman is a relatively rare fish but to catch and fetches a strong price. Boetie's hope, he explained to me back at the harbor was to catch one or two at every reef covered on a trip to contribute towards petrol expenses "or at least give us something to eat".

Not working with a set plan of action, rather an adaptive strategy, Boetie summed up his thinking on the matter early 2011 as we sat talking in his kitchen. The conversation turned to a previous trip during which we failed to find any Kob.

> Greg: Ja Boetie, but I notice that when we go out [to sea] and I ask you where we are going you are always very vague...

> Boetie: (laughing) haha, ja I saw that got to you this last time, hey? It's no good to have a plan – you will just get disappointed and frustrated. My only plan is to be open to the sea and the fish. You can have all the hi-tech equipment and weather science stuff off the internet from Windguru that you want but unless you're out there on the spot, looking for the Kob...you're not going to find him unless you are prepared to look...
>
> The Kob moves fast, you've seen that. Especially now. Who knows why but I can see him here today, tell you about it and by the time you are there he's long gone man, long gone far away...so going to sea as a strict person with a map and a plan – there was a guy like that who came here once. He was one of the first guys with GPS from Mosselbay. He was going to come here and show us how. (Laughing) I have to laugh at those guysthat try that hey, they don't last long – a commercial fisherman doesn't have the luxury of time, he must think on his feet and adapt all the time.

Similarly, Oom Louis suggested that adaptability was a key asset in the strategy of a successful commercial fisherman:

> Oom Louis: look man, as I have told you before, we are always learning, neh? And through learning I will tell you, we have seen that if you want to catch fish, you must adapt or die *ou pal*. This is the way or you will surely starve. Look there's guys who say they *know* where the fish is going to be. They go straight there, far away to some or other bank and they find f****** nothing, nada. You know why? Because this kind of guy is stupid – he doesn't stop to think "hang on, maybe I must *look* for the fish because the fish is not a bloody sheep that will follow you, it is not stupid". He thinks he can predict a fish! Hah. No *boetie* [here Oom Louis is using the term *boetie* in reference to me. It is a term of familiarity used by an older generation to address younger males] that will never happen. You can have all the science and stuff and GPS points you want – that is why you see when we were out the other day and you asked me why I don't have a log of all the spots I've caught fish at – It's because things change. I have marks for the better banks but even they come on and off and you can't say for how long or when. It just happens and you must fish with it or you catch nothing.

In early 2011 I caught up with Oom Louis outside his house by chance as I was leaving Oom Jannie's. I hadn't seen Oom Louis for the better part of a month and asked him where he had been. I asked him what his plan was for dealing with the sudden downturn in Kob catches:

> Oom Louis: This is why we go to Gouritz now – we don't know where the fish is but we must look. Maybe it's not there – it hasn't been now for two weeks. But maybe some Geelbek or even Hake will come in soon. But this I can tell you: a fisherman who tells you he has a plan and that it works – that is a man who is lying to you. Yes you must know how to catch fish when they are there but to find them you must observe and you must react and be open to all kinds of strange stuff I tell you. It's not just a case of knowing the weather and the water, it's much more than that.

In order to negotiate complexities and changing circumstance, cultivating potential is an adaptive means of negotiating variable terrain of life. By focusing in the moment on the events in which they are engaged and on their immediate interactions with fish, fishers draw on an adaptive relationship with enables them to work with the potential of circumstance as it changes over time. In the commercial handline sector, especially in Stilbaai where Kob, the dynamic, sensitive, reactive and complex beings are the principle object of pursuance, using a rigorously structured plan to catch them will almost certainly guarantee failure because variability is a central characteristic of fishing and fish. Instead, what appears to work far more effectively is reliance on potential which is informed by an ethical ecological relationality and thinking in terms of the ways in which fish interact with fishers. The plan then is to not have a plan, rather a set of embodied skills and knowledges which are premised on acknowledgement of variability. As such, fishers employ a range of strategies, knowledges and practices which allow them to work adaptively with circumstance and the potential of a situation.

Economic and ecological wellbeing

The adaptive strategies I have covered thus far were engaged more explicitly during times of economic hardship. There is a point to be made here however: economic concerns are certainly of great importance to all the fishers but these are offset in most cases by a relationality that acknowledges that economic gain is important, but equally important are the wellbeing of fish and the ecosystem. My sense during my time in Stilbaai was that fishers' approach to working sustainably with the ecosystem and fish derives from a recognition that in order to sustain profits a healthy ecosystem and fish population are of the utmost importance. The adaptive capacity of this relationality means the balance between ethical ecological and economic thinking is constantly evaluated .At its core of this relationality is a perception that in order to survive, fishers must make concessions to the requirements of fish and the marine ecosystem:

Boetie: ...you see any guy can get on a trawler and catch fish...it's just nets. Or that guy over there (pointing to a recreational boat to our starboard) can follow the fishermen or ask for GPS coordinates from us...but to be a fisherman like us you must be committed to a lifestyle, you understand? It must occupy your mind all the time – I watch the programmes on Discovery channel and I learn from them what they say about fish – where does it go, where does it move around...If you can't learn to love the sea and fishing and you don't want to know more about the fish then it's not a life for you.

Oom Louis: Of course I'm in this to make money man! But it's no good if it's not sustainable. Look at my sons. There three of them and they all fish – with me or on their own boat. This is a good life, it's the only one they know – their father is a fisherman. But I want to be successful and catch fish until they can choose for themselves whether they bring their kids into (the fishing industry) as well. It is hard though because we are always labelled the *dom visserman* [the stupid fisherman] who doesn't care for the sea. That's rubbish man. I care – if I didn't and I f***** around with the sea all the time and wasted fish then there'd be no more for me or my *lighties* [colloquialism for children] to catch. The knowledge we have learned, neh, it's about balance I will say...Look, I *must* catch fish today in order to survive but I can't kill it all. And that's the beauty of a handline – if I catch one out of every ten fish in a shoal that's a lot. We will never fish out the sea as handliners because of this.

In an interview with Oom Oom Koos and Oom Louis, the fishers discussed this sense of balance between economic gain and the preservation of species:

Oom Louis: [laughing] you'll get stressed if you ask questions (when we're out on the boat) – I'm f****** half crazy - I sometimes throw back fish – like the Red Steenbras – I don't take Red Steenbras out – it's my part of conservation – there's lots of fish I don't take.

Oom Koos: - ja many times we throw it back when you're catching lots of kob you throw it back – and also the big sharks – we don't pull out big sharks anymore because you don't get money for it. Over 12kilos then you can throw it – I knip my line –

OL: - like a hammerhead – a hammerhead you get R2.50 for!

OK: ja, R2.50 per kilo – why would you kill an animal for that!?

OL: no one on my vessel is allowed to take a hammerhead, I won't take it back.

Where an ecosystems services approach to working with local people to conserve natural resources holds that by demonstrating the economic value of these resources to people they will come to care for and conserve them, the Stilbaai fishers challenged the assumption that they think of fish purely in terms of income generation. Fishers like Oom Louis, Oom Jannie and Oom Koos all had sons involved in fishing as skippers or crew. They encouraged and nurtured their sons' fishing careers and were concerned about maintaining healthy fish stocks into the future, seeking to actively adapt and balance their income needs with the wellbeing of the bay ecosystem.

Conclusion

In a (1998) article entitled *Cosmological Deixis and Amerindian Perspectivism*, Eduardo Viveiros de Castro outlines an Amerindian perspectivism: "the ways in which humans, animals and spirits see both themselves and one another" (1998: 469). Amerindian perspectivism, argues Viveiros de Castro (1998) is 'multinaturalist' as opposed to the multiculturalism of modernist ontology. The implication here is that, rather than perceiving of a single universal nature and many cultures, Amerindian perspectivism sees the world as comprising many natures or modes of being in which all living beings share a consciousness – the capacity to think, respond and adapt - but take on many varied bodily forms (Viveiros de Castro, 1998; 2004). In this sense, consciousness is universal and common to all beings, and natures (read different bodily forms) are what differ between them (Viveiros de Castro 1998; Latour 2009). The notion of multinaturalism and perspectivism echoes with the relationality of the fishers in which Kob are ascribed a social nature in their interaction with the social network of fishers (Viveiros de Castro, 2004). In the interaction with fishers, the Kob come to be known as social agents (*ibid.*) through the fishers' assumptions and practices regarding what behavioral and physical possibilities of fish exist. So through their relationship with the fishers, their association to them, they are interacted with socially, thereby entering the social network as fellow social agents which exert influence in that network (*ibid.*). The complex adaptive relationship then, comes to inform and affirm an account of nature in which fish are lively, adaptive, complex and knowing beings which recognise the interaction with fishers and change their behaviour accordingly. The fishers in turn recognise the fish through the relationship of interaction and are themselves changed through this. In this way the relationship is one of mutual recognition and bringing into being. The ability to adapt to circumstance is an evolutionary mechanism which is present in everyday life and represents a form of inherent intelligence. Fishers perceive fish as adapting to environmental, ecosystem or anthropocentric influence. Just as the fish adapt to the presence of humans in their world, so too

the humans adapt to the behaviour of the fish and ecosystem. In this way, the dance between predator and prey is a mutually adaptive complex relationship. The complex adaptive strategies which emerge from this relational engagement embrace the potential which arises in varying circumstances, allowing fishers to engaged a range of strategies in dealing with variability not only in the fishing environment.

When Oom Tem, for example, speaks of the need to leave reefs and plant life time to heal or Oom Jannie talks of the threat to fish populations of fish dumping, they narrate a relationality which operates from an account of nature as reactive and engaged in a feedback relationship with humans in which actors mutually influence each other. Following from this, is a concern with safeguarding the *umwelt* of fish. They are aware that their own actions can have lasting and widespread effects on the ecosystem and that the actions of fish can have similar impacts on fishers. Viewed in this light, fishers are responsive and on the whole, responsibly adaptive as are the marine actors they relate to.

Another characteristic of this relationality is an ethical position which balances economic with ecosystems concerns. In the stories, interviews and conversations presented in this chapter, a sense emerged of fishers 'thinking like fish' not only to locate, attract and catch them, but also to think through ways of conserving their populations and habitat and learn from them. Certainly there are economic imperatives but the relationality in which they operate suggests that there are limitations to their fiscal motivations and that caring for the wellbeing of fish and their *umwelt* is essential. When Oom Koos expresses his disgust that people would take the life of a shark for so little money, or when Oom Jannie considers the cost to fish populations of fish dumping, the fishers are operating from a position which places ethical and ecological matters on a par or even above the need to derive profits. Similarly, discussing his sons' futures in the fishery, Oom Louis conveys a strong desire to maintain the health of the bay that they might inherit a profitable and sustainable place in which to work. Learning is also key to his relationality. Oom Louis conducts research with his sons, opening up different fish, fishing different locations to test theories; Oom Koos and the other fishers all experiment with different baits and line colours and Oom Tem constructs different types of anchors to protect the reefs. Lastly, it is apparent that all of the fishers are engaged in future thinking.

Operating from within this account of nature imbues fishers with a particular set of assumptions and ways of interacting and perceiving the world. Far from seeing the world in terms of the division of nature and culture, theirs is a nature culture in which interaction with fish cannot be separated from knowing and being and thus nature cannot be separated from culture because

they are an emergent becoming. Employing a mimetic framework, they move between the worlds of humans and fish, entering the *umwelt* of the latter, seeing from the perspective of fish while maintaining a 'double perspective' (Willerslev, 2004) which keeps them simultaneously grounded in their human concerns. Drawing on this mimetic relationality, this double perspective enables them to consider ecosystem health from the perspective of fish and in doing so, think from their position in order to catch them. They move between the worlds of humans and fish, borrowing adaptively from Western science and local environmental and traditional knowledges. In the opening quote of this chapter, Hester and Cheney (2001) suggest that the dominance of modernist thought which distinguishes so absolutely between what it sets up as separate realms of nature and culture has resulted in an ethically impoverished epistemology. Operating from a position which sets out to dominate 'non-humans', modernity is in essence "a paradigm of war…a way of conceiving humanity, knowledge and social relations that privileges conflict or *polemos*" (Maldonado-Torres, 2008: 3). As such it is small wonder that management paradigms which set out to control fishers and force them to adhere to prescriptive legislature have largely failed from the outset by not only ignoring local circumstance but by missing the opportunity to work with complex adaptive relational strategies.

In light of this, approaches such as an EAF are seeking to operate ethically with local knowledges. However, since an EAF is itself emergent from within a society dominated by modernist thinking, it is necessary that such an approach allow itself the flexibility, in working with various accounts of nature, to be informed by these and the reflexivity to think through their application with those who operate from different accounts of nature. What I have presented in this chapter is an alternative; an ethical ecological relationality of interaction which, by destabilizing boundaries between nature and culture while still working with capital, ethical and ecosystem motivations, challenges ecosystem services-type accounts of nature. It is by no means a perfect answer to the problems facing South Africa's beleaguered fisheries but what it does provide is another viable means of thinking through and working ethically with an ecosystem and the people who influence and are influenced by it.

Conclusion: Where to from here? Relationality, dialogue and an EAF

In this dissertation I set out to think through the nature of knowledges. In a story of knowledges based in a small commercial handline fishery, I drew upon ethnographic interviews and observations conducted with fishers in conjunction with theoretical and analytical work by, amongst others, Lien and Law (2010), Turnbull (2000; 2009), Latour (1999), Verran (2001; 2011 forthcoming) and von Uexküll (1934).The social-ecological outlook which frames the practical concerns of the work was influenced by the scholarship of Ommer and team (2007), Ommer *et al* (2011), Neis and Felt (2000), Neis (2011), Berkes (2011) and Murray (2011). In order to think through a range of challenges facing social-ecological approaches to fisheries research and management, in particular an Ecosystems Approach to Fisheries Management I proposed working with a relational ontology. Exploring interactions between fishers, sciences, fish and the marine ecosystem, I drew upon this analytic to destabilize categories of knowledge and think through new ways of working with knowledges and ways of relating to the world. The intention behind this approach is to think through new ways of understanding knowledge claims in the context of emergent social-ecological approaches to research and management in fisheries with a view to opening dialogue and collaborative possibilities in social-ecological systems.

The stock assessment management paradigm which continues to dominate South Africa's fisheries has emerged from within a modernist belief in the separation of society from the natural realm. This approach favours a focus on individual species rather than whole ecosystems and largely ignores the role of people in these. As van Sittert (2003) has shown, the influence of capital in the country's fisheries has resulted in entrenched power and monetary dynamics which continue to sideline the concerns of many fishers, particularly small-scale groups. A moral economy of gain typifies this management style. The ethics which attends this is premised on the maximization of profits and shows little concern for economic or social inequalities amongst previously (and currently) disadvantaged people.

In investigating these issues, a number of prominent South African social scientists have drawn on political ecology and cognitive justice as analytics that might begin to move conversations forward. Both analytics, however, rely on notions of identity politics. It is my belief that such an approach, while pushing research forward in thinking through these issues, is limited in its ability to rethink the relations between the networks of people and other beings by its adherence to social categories and explanations of events and circumstance. In so doing this analytic relies on a distinction between social and non-social realms. If steps are to be taken in working with a

social-ecological focus, the decoupling of the social from the ecological will prove a stumbling block from the outset.

An EAF addresses a range of issues in fisheries management by proposing interdisciplinary, ecosystem-wide research which seeks to recognize and work with fishers as authorative collaborators. Working with social-ecological systems as integrated wholes; blending qualitative with quantitative data and fostering interdisciplinary collaboration pushes conventional management paradigms. As a means of addressing the pressing issues facing South Africa's fisheries, recognition of complexity and interconnection bodes well on the face of things but also brings with it a range of new challenges to research.

Where an EAF approach seeks to integrate the knowledges of fishers and scholarly disciplines, there is an implicit reliance on discrete categories of knowledge. Referring to 'fishers' knowledge' as distinct from 'scientific knowledge' and seeking to integrate these into a management paradigm places an EAF in a difficult position. Categorizing the knowledges of fishers as a bounded definable knowledge may compromise the project by not taking nuances into account. Throughout this dissertation I have argued that knowledges are fluid, emergent, unbounded and often overlapping. To speak of homogenous, discrete categories and integrating these with the complex of academic knowledge poses the risk of subsuming an imagined whole into the folds of an established discourse with an entrenched and dominant intellectual heritage, in which certain ideas dominate and will transform others through processes of translation and practices of smoothing as previously discussed with untold results. Moreover, the integration of knowledge poses a possibility of dislocating knowledge from its time-space context of emergence (Palsson, 2000), thereby losing the context which lends these their applicability in the first place.

A second challenge facing an EAF is the modernist notion of a separation of nature from society. Working with a social-ecological frame, an EAF takes steps to overcome this, perceiving social and ecological systems as integrally interlinked realms of mutual influence (Ommer and Team, 2007; Ommer & Perry, 2011; Berkes, 2011). The approach pushes the paradigm but does not quite manage to affect the conceptual leap. Although perceived as interrelated Berkes (2011: 9) defines social-ecological systems as "integrated complex systems that include social (human) and ecological (biophysical) sub-systems in a two-way feedback relationship". Berkes (*ibid.*) goes on to say that the notion of the social-ecological "empathizes that the two parts (social system and ecological system) are equally important, and they function as a coupled, interdependent, and co-evolutionary system". Thus although the approach seeks to recognise a unified whole, two separate sub-systems, although interconnected, remain part of the account.

In chapters two and three I argued that all knowledges emerge from within networks of interaction between actors. Through their interactions, assumptions and practices, these shape versions of reality and the knowledge claims which attend these sustain themselves through narratives which affirm their underlying assumptions about the nature of the world. A relational ontology suggests that the interactions between actors allow them to recognise one another (their assumptions and experience inform how they perceive one another) and in so doing bring one another into being, creating meaning from the interaction. The actors, interactions and assumptions change with circumstance and time and thus people's accounts of nature are fluid and emergent. As overlapping and interactive as they are, accounts of nature and their knowledges are influenced by one another, drawing from and including aspects of others whilst rejecting parts of themselves and others. Since knowledge claims emerge from networks of practice and interaction and knowledges show a range of convergences and overlaps, to speak of distinct knowledges or claim access to universal truth is artificial. Furthermore, maintaining a distinction between nature and culture is not representative of the world "as it is" but rather is a performance of a particular relational engagement. Thus to speak of distinct 'fishers' knowledge' as separate from 'scientific knowledge' is erroneous. With this said, I spoke of fishers and scientists, but acknowledged that these are performances of particular interactive engagements with others at given times. They emerge and change fluidly, at other times engaging altogether different accounts of nature and performing different roles. So fishers are researchers, fathers, teachers, businessmen and so much more dependent upon circumstance. In rethinking knowledges in this way my intention has been to provide a space in which dialogue might take shape between EAF participants devoid of hierarchies of knowledge. Focusing on the ways in which knowledges emerge and are performed, I argued that there are both convergences and divergences inherent in the knowledge claims of various accounts of nature. Both convergence and divergence present the possibility of partial connections (Strathern, 1991), enerative events and dialogue (Whatmore, 2009; Verran, 2011 forthcoming).

If fishers' knowledges are not collected and worked with in systematic ways, argues Neis (*ibid.*), there is potential to take the knowledge of the few to represent the knowledge of the whole, thereby sidelining many fishers through a politicization of their knowledge in which certain representatives may present particular relationalities and push agendas. If this is not mitigated against, where fishers and scientists are involved in decision-making meetings, fishers are often engaged as a political group (*ibid.*) more than researchers. If fishers are deferred to in these meetings, argues Neis (2011: 186), scientists may well view this as the "politicization of science – LEK (seen as opinion and interest group politics) will be perceived, perhaps correctly, to have

"trumped" science..". Moreover, argues Neis (*ibid.*) the growing momentum towards the adoption of co-management and social-ecological models of management rather than stock assessment models serve to strengthen perceptions of sidelining amongst scientists.

It is important to note that whilst an EAF, and indeed my research, attempt to level the playing field of knowledges, amongst the many hurdles to be overcome there is a point of contention to which experts will always return. As Neis (2011) suggests, academic disciplines, while displaying commonalities and convergences with the knowledges of fishers, are grounded in disciplinary training. Social and natural scientists no matter what the discipline will claim that their particular position is valid because it has been thought through, argued over, challenged, tested and developed. In short, knowledges, whilst overlapping and fluid, are created for particular purposes which may be differently oriented to the context and purpose of others. Through peer review, presentation and writing in journal article, book or thesis, scholarly knowledges become formalized, imbued with a performative aura of authority. While they remain subjective opinion, these processes involved enact that opinion in authorative forms. Similarly, in creating their knowledges, fishers think many things through in their interactions with other actors. They formulate and test hypotheses (Stanley & Rice, 2003) and, as I witnessed in my fieldwork, conduct research and develop their knowledges through similar channels of discussion, presentation, argumentation, challenging and testing under a range of lived conditions upon which their physical and economic survival depend. However, with this said, there are also instances in which fishers or scientists may make statements which have not undergone these processes. Neis' (2011) suggestion in light of this and the challenge of representation is to work with fishers' knowledges as representative of only those who participated in the process and not those of the group. The imperative here then is to work with as many fishers in a fishery as possible.

The need to work with complexity but simplify this in order to meet practical concerns of management is another pressing concern for an EAF. As Starfield and Jarre (2011) have shown in their rapid prototyping models, it is possible to work with complexity in an EAF whilst still conducting explicit simplification. Whilst the process of modelling must of necessity trim certain complexities from the inputs, these must be agreed upon by all participants (*ibid.*). The point here is that for an EAF to succeed in full it must submit to all participants. If, from the outset, it is truly inclusive, respectful, flexible, adaptive and reflexive enough to shift its' own paradigm and allow itself to be influenced by interdisciplinary as well as fishers knowledges equally there is potential for success. One of the possible strengths of an EAF is that it challenges a stock

assessment-type system by explicitly acknowledging both the complexity of a situation as well as the data streamlining which goes into the production of predictive models.

Working with a relational ontology refutes a categorical separation of nature from culture and posits rather, interwoven natures cultures. In this conception, which acknowledges and works with the chaos and dynamic complexity of life, it is recognized that we are of nature, influencing one another in a feedback relationship. In chapter three I showed how a nature-culture distinction came to be enacted as a factual account of the nature of reality, in conjunction with the rise of modernism. The ethics which attend this outlook are anthropocentric in scope, emerging from a context of *polemos* and thus disenfranchise non-human worlds. Contrastingly, where an ethics is concerned a focus on relationality returns the locus of influence squarely onto the shoulders of those who claim a particular knowledge. For if one perceives all knowledges as contextually-generated and subjectively contingent, the implication is that those who wield a particular knowledge do so contingently upon their interactions with others. There are many natures shaped by interactions and as such to claim an ethics based on an objective knowledge or 'truth' 'out there' is false. Relationality suggests that ethics originates within interactions between natures and cultures in an inseparable whole and is both internal to a particular person's reality and constituted through interactions with other beings. As such it disputes the concept of ethics as purely cultural or based on an account of a universal shared nature/reality, returning the onus of ethics to the actors rather than ascribing it a universal origin. Moreover, if nature and culture are perceived in terms of an interwoven network, irreducible from the whole, then of essence an ethics which emerges from this takes cognizance of the rights and well-being of all living beings equally.

Berkes (2011), writing on the concept of social-ecological knowledge has suggested that "to restore unity in managing marine social-ecological systems, there is a need to reconnect natural science, social science, and humanities perspectives, and reconcile the various disciplines with largely different scientific traditions". In response to this suite of challenges, Berkes (*ibid,*) posits a three-pronged approach including recognizing and working accordingly with what the author refers to as social and ecological sub-systems; formulating appropriate complex adaptive strategies to deal with complex variable, shifting and unpredictable social-ecological systems; working with participatory models throughout all stages of research and management.

Working with a relationality has significant repercussions for Berkes' (2011) suggestions. Firstly, the notion of social and natural sub-systems falls away when one applies a relational ontology. If a particular claim to knowledge about the world is based on a set of assumptions regarding what

is possible and exists in the world, then speaking of a separation of nature and culture is but one possible way of relating to the world. As I have shown in the preceding chapter, the narrative of the fishers suggests an immersion of the natural in the social in which each constitutes the other and is thus inseparable. Secondly, as I have demonstrated, the fishers of Stilbaai work with a complex adaptive model born out of an interactive relationship with fish. This model relies on the potential of a situation and is suited to a context of high variability. Lastly, through the performative relational approach to knowledge employed in this dissertation, I have shown how the convergences, divergences and disconcertments which arise when the knowledges of experts are placed in conversation show a range of partial connections, commonalities and overlaps. These, I have argued, reveal the potential for generative dialogue. Moreover, the fishers with whom I worked displayed an enthusiasm for research and collaboration with other researchers.

Having provided a brief history of Stilbaai and the relations between people, fish and sea in chapter one, chapter two introduced a relational ontology. In this chapter I drew on ethnographic examples to explore a number of convergences – overlaps or 'partial connections' in which the boundaries of knowledge blur. I argued that categorical distinctions are arbitrary constructions which ignore the overlaps which knowledges share. In light of this I asserted that reliance on categorizations of knowledge impair the ability of people effectively and respectfully communicate and that acknowledgement of convergence is an important first step to initiating meaningful collaboration.

In chapter three I suggested that while there are convergences between knowledges, there are also moments of divergence in which disconcertments may arise. Drawing on Lien and Law's (2010) performative analytic I traced the ways in which different knowledge claims narrate accounts of nature, in this instance the actor Kob. Rather than prohibiting further communication, I argued that disconcertments are important nodes which need to be followed because these challenge knowledge positions and accounts of reality to examine both their and the knowledge claims of others. Taking a cue from Verran's (2011 forthcoming) work I suggested that the strength of working with disconcertments is that these may challenge assumptions and conventional approaches to management, offering the possibility of more effective means of working with fish.

In the final chapter, I explored a relationality – and ethical interactional engagement between fishers, fish and the marine ecosystem. At the heart of this relationality is a process of 'thinking like fish' which informs a particular ethical and ecological engagement which does not place

economic gain above the wellbeing of fish and their *umwelt*. As such this relationality suggests an alternative means of thinking about and relating to marine ecosystems.

Certainly, some aspects of knowledges are more thought through than others. In the context of an EAF, working with different ways of relating to the world poses a number of challenges. The project of collaborative integration of knowledges risks on the one hand, uncritically working with knowledges and on the other, exposing knowledges to translation by dominant scholarly discourses. Scientists may spend months or even years working with a particular problem where a fisher or group of fishers may not have given as much thought to the same topic and precisely the opposite is also true – there are many issues which fishers concern themselves with, debating and thinking these through extensively only to find that these are not issues identified by, for example DAFF management. In an EAF setting, both might be asked to provide insight into a particular issue and offer an answer. In this situation understanding the purposes of knowledges and the relationalities which inform them takes on a new importance. One means of negotiating this terrain, following Neis (2011) is to work systematically with knowledges.

Writing on the concept of wisdom, Ommer and Team (2007: 37) suggest that it is typified by an ability to work with knowledge and experience in the grey areas of life. Wisdom is "being unafraid to try new things when new opportunities...require it...but it also means doing so with the humility of the acknowledgement of human capacity for error...it means respecting uncertainty". An understanding of underlying processes through reflection is also essential and imbues wisdom with the capacity to "speak to the specific but...also cope with the unexpected" (*ibid*) due to its broader understanding of systemic forces. In this thesis I have suggested a relational ontology offers an approach to working with knowledges and different relational engagements with the world. Working with this approach, I revealed a relationality amongst the Stilbaai fishers which is both ecological, ethical and adaptive. Working with the potential of the situation and remaining reflexive are core values of this relationality and it is my belief that they offer an alternative means of relating to the world. The strength of an EAF is its' openness and adaptiveness. Working with a relational ontology in an EAF, I believe, imbues the approach with a renewed adaptive flexibility, rendering it reflexive enough to allow itself to be informed by local relationalities and ways of becoming.

The context of scarcity and multiple threats and variabilities facing South Africa's fisheries; the dire need to address problems of threatened fish populations on both coasts; safeguard ecosystems; redress social and -economic inequalities which remain largely entrenched and sustain a large industry which supports thousands of people with food and jobs must be

balanced with research which takes the time to understand these challenges. Without such research however, the entrenched problems which have resulted under the traditional system will only become exacerbated over time. The shift that I have pushed, away from an identity politics and associated social explanations of the world towards an approach grounded in a relational ontology, has a profound repercussion amongst those who would work with knowledges in contested ecologies. If those working with EAF approaches were to move the discussion from one of epistemology, in which science claims access to reality through universal truths, to one of relational ontology in which knowledge claims are placed on a level playing field with other knowledges it is my belief that this will better serve the project of working with fisher's knowledges in collaboration with interdisciplinary scholarly knowledges.

In focusing on the production of knowledge rather than comparing the end results, it is possible to create a more symmetrical and respectful conceptual and dialogic space in which no one knowledge is privileged above another. The knowledges cited in this dissertation, while demonstrating convergences, commonalities and overlaps at times, offer a range of partial connections, not complete ones, because the purposes which guide experts from different disciplines influence their relationalities. The project moving forward then is a difficult but necessary challenge: maintaining the characteristic strengths of knowledges while consciously working towards understanding these and putting them into practice in the complex network of management in meaningful, respectful and effective ways.

In order to deal effectively with the challenges facing collaborative work, it is necessary to recognize and work through issues of trust and the purposes for which knowledges emerge. My research suggests that the relational ontology approach, carried out in a context of mutual respect and open-mindedness, offers the potential to foster meaningful, respectful dialogue and collaborative research in South Africa's emergent Ecosystems Approach to Fisheries Management.

Bibliography & References

Agrawal, A. 1995. "Dismantling the divide between indigenous and scientific knowledge" *Development and Change* 26: 412-439

Agrawal, A. 2005. *Environmentality: Technologies of Government in the Making of Subjects*. Durham & London: Duke University Press

Agyrou, V. (2005) *The Logic of Environmentalism*. New York, Berghahn Books

Anderson, T. 2010. "Narratives of Loss: The exclusion of Kalk Bay's traditional hand-line fishermen from the access to common property rights". Unpublished Honours Thesis. Department of Social Anthropology, University of Cape Town, South Africa.

Anderson, T. 2011. "Tracking the Movement of Fish: Skipper's Logbooks and Marine Knowledges in Fisheries Management". Unpublished M.A. thesis. Department of Social Anthropology, University of Cape Town, South Africa

Anderson, T. Draper, K. Duggan, G. Green, L. Jarre, A. Ragaller, S. Rogerson, J. van Zyl, M. 2011 forthcoming "Conservation conversations: Initial findings on contestations over fisheries science along the Benguela coast". Working paper presented at Contested Ecologies: Natures and Democracies in the Global South, Franschoek, South Africa, 16th September 2011.

Berkes, F. Mahon, R. McConney, P. Pollnac, R. and Pomeroy, R. 2001. *Managing small-scale fisheries: alternative directions and methods*. Ottawa: International Development Research Centre (IDRC).

Berkes, F. 2011. Restoring Unity: The Concept of Marine Social-Ecological Systems.In Ommer and Team(eds) *World Fisheries: A Social-Ecological Analysis*. West Sussex: Wiley-Blackwell

Blaser, M. 2009. "Political Ontology: Cultural Studies without 'cultures'?" *Cultural Studies* 23(5-6): 873-896

Butterworth, D. 1999.Printed Open Lecture, "*Taking Stock: Science and Fisheries Management Entering the New Millennium."* Department of Zoology, University of Cape Town

Chakrabarty, D. 2009. "The Climate of History: Four Theses." *Critical Inquiry* 35: 197-222

Department of Environmental Affairs and Tourism (DEAT). 2001. *Coastcare Fact Sheet Series*. Pretoria: South African Government Press.

Dengbol, P. 2003. "Science and the user perspective: The gap co-management must address." in Wilson, D. C. Nielsen, J. R. and Dengbol, P. (eds), *The Fisheries Co-management Experience: Accomplishments, Challenges and Prospects*. Fish and Fisheries Series 26, Kluwer Academic Publishers.

Dengbol, P. And Jarre, A. 2004. "Review of indicators in fisheries management –a development perspective." *African Journal of Marine Science* 26: 302-326

Draper, K. 2011. "Technologies, Knowledges, and Capital: Towards a Political Ecology of the Hake Trawl Fishery Walvis Bay, Namibia." Unpublished M.A. thesis. Department of Social Anthropology. University of Cape Town, South Africa

Erdelen, W. 2007 "Foreword" in Haggan, N. Neis, B. and Baird, I. (eds) *Fishers' Knowledge in Fisheries Science and Management*. Paris: United Nations Educational, Scientific and Cultural Organization.

Escobar, A. 1995. *Encountering Development: The Making and Unmaking of the Third World*. Princeton: Princeton University Press

Escobar, A. 2008. *Territories of Difference: Place, Movements, Life, Redes*. Durham & London: Duke University Press

Escobar, A. 2011 (1995). *Encountering Development: the making and unmaking of the Third World*. Preface to the 2011 Edition. Princeton: Princeton: Princeton University Press

United Nations Food and Agriculture Organisation. 2005. "FAO Yearbook – Fishery Statistics, Capture Production." Vol. 100/1. Rome: FAO Fishery and Aquaculture Information and Statistics Service, Rome, FAO 2007 (printed)

Finlayson, A. C. 1994. *Fishing for Truth: A Sociological Analysis of Northern Cod Stock Assessments from 1977-1990*. St. John's: Institute of Social and Economic Research, Memorial University of Newfoundland.

Goldman, M & Schurman, R. A. 2000. "Closing the "Great Divide": New Social Theory on Society and Nature." *Annual Review of Sociology* 26: 563 – 584

Haggan, N. Neis, B. and Baird, I. (eds). 2007. *Fishers' Knowledge in Fisheries Science and Management*. Paris: United Nations Educational, Scientific and Cultural Organization.

Hara, M. & Raakjaer, J. 2009. Policy evolution in South African fisheries: the governance of the sector for small pelagic. *Development Southern Africa* 26(4): 649-662

Haraway, D. 2008. *When Species Meet*. Minnesota: University of Minnesota Press

Harman, G. 2009. *Prince of Networks: Bruno Latour and Metaphysics*. Melbourne: Re-press

Hauck, M. Sowman, M. 2003. *Waves of change: Coastal and fisheries co-management in South Africa*. Cape Town: University of Cape Town Press.

Hester, L and Cheney, J. 2001. Truth and Native American epistemology . *Social Epistemology* 15(4): 319–334

Ingold, T. (2000) *The Perception of the Environment: Essays in livelihood, dwelling and skill*. London: Routledge

Ingold, T. 2007. *Lines: A brief history*. London : Routledge.

Isaacs, M. and Mohamed, N. 2000. "Co-Managing the Commons in the 'New' South Africa: Room for Manoeuvre?" Unpublished paper presented at the 8th Biennial Conference of the

International Association for the Study of Common Property entitled, *Constituting the Commons*, May 31 – June 4, 2000

Isaacs, M and Hara, M. 2008. Mainstreaming of HIV and Aids into South African fisheries policy. PLAAS Policy Brief No. 27.

Isaacs, M. Hara, M. Raakjaer Nielsen, J. 2005. *South African fisheries reform – past, present and future?* PLAAS Policy Brief No. 16

Isaacs, M. Hara, M. Raakjaer, J. 2007. "Has reforming South Africa's fishery contributed to wealth redistribution and poverty alleviation?" *Ocean and Coastal Management* 50: 301-313.

Johannes, R. E. and Lamb, M. 1999. "The live reef food fish trade in the Solomon Islands." *SPC Live Reef Fish Information Bulletin no. 5* – April 1999

Jullien, F. 2004. "Relying on the propensity of things" in *A treatise on efficacy: Between Chinese and Western Thinking*. Honolulu: University of Hawaii Press

Latour, B. 1993 (1984). "Irreductions" in *The Pasteurization of France*. London & Cambridge: Harvard University Press.

Latour, B. 1997. "On Actor Network Theory: A Few Clarifications." http://amsterdam.nettime.org/Lists-Archives/nettime-l-9801/msg00019.html July 18 2011.

Latour, B. 1998. "From the World of Science to the World of Research?" *Science* 280(5361): 208 – 209

Latour, B. 1999. "Circulating reference: sampling soil in the Amazon rainforest." in *Pandora's Hope: Essays on the reality of science studies.London & Cambridge*: Harvard University Press.

Latour, B. 2004a. *Politics of Nature: How To Bring the Sciences Into Democracy*. London & Cambridge: Harvard University Press

Latour, B. 2004b. "Why has critique run of steam? From matters of fact to matters of concern." *Critical Inquiry*. 30: 225-248.

Latour, B. 2004c. "Whose Cosmos, Which Cosmopolitics? Comments on the peace terms of Ulrich Beck." *Common Knowledge* 10(3): 450-462

Latour, B. 2005. *Making things public: Atmospheres of democracy*. Massachusetts: MIT Press.

Latour, B. 2009. "Perspectivism: Type or Bomb?" Guest editorial., *Anthropology Today* 25(2): 1-2

Law, J. 2004. *After method: Mess in social science research.* USA: Routledge.

Lien, M. and Law, J. 2010. "Emergent aliens: performing indigeneity and other ways of doing salmon in Norway." Unpublished Working paper. 1-19.

Little, P. (1999) "Environments and Environmentalisms in Anthropological Research: facing the new millennium." *Annual Review of Anthropology* 29: 253-284

Louw, C. Scheepers, T. Botha, Z. De Beer, M. Döckel, H. Scott, P. Louw, R. And Collen, M. 2006. *Melkhoutfontein*. Stilbaai: Die Stilbaai Skryffkring

Maldonado-Torres, N. 2008. *Against War: Views from the Underside of Modernity*. Durham & London: Duke University Press

Masifundise: www.masifundise.org.za October 8th 2011

Meij, Rand Mathiesen, B. 2009. *The Fish Traps of Stilbaai*. Stilbaai: Hessequa Society for Archaeology

Mol, A. 2002. *The body multiple: Ontology in medical practice*. Durham & London: Duke University Press

Murray, G. Neis, B. Johnson, J. 2006. "Lessons learned from reconstructing interactions between local ecological knowledge, fisheries science and fisheries management in the commercial fisheries of Newfoundland and Labrador, Canada." *Human ecology* 34: 4.

Murray, G. 2011. "Social-ecological restructuring and implications for social values." in Ommer, R. Perry, I. Cochrane, K. Cury, P. (eds) *World fisheries: A social-ecological analysis*. West Sussex: Wiley-Blackwell.

Neis, B. Schneider, D. Felt, L. Haedrich, R. Fischer, J. Hutchings, J. 1999. "Fisheries assessment: What can be learned from interviewing research users." *Canadian Journal of Fisheries and Aquatic Sciences* 56:(10) 1949-1963.

Neis, B & Felt, L. F. (eds) 2000. *Finding Our Sea Legs*: *Linking Fishery People and Their Knowledge with Science and Management*. Newfoundland: ISER Books

Neis, B. 2011. "Moving Forward. Social-Ecological Interactivity, Global Marine Change and Knowledge for the Future." in Ommer, R. Perry, I. Cochrane, K. Cury, P. (eds) 2011. *World fisheries: A social-ecological analysis*. West Sussex: Wiley-Blackwell.

Ommer, R. E. with the Coasts Under Stress Research Project Team. 2007. *Coasts under stress: restructuring and social-ecological health*. Quebec: McGill-Queen's University press.

Ommer, R. Perry, I. Cochrane, K. Cury, P. (eds). 2011. *World fisheries: A social-ecological analysis*. West Sussex: Wiley-Blackwell.

Palsson, G. (2000). "Finding one's sea legs: Learning, the process of enskilment, and integrating fishers and their knowledge into fisheries science and management." in Neis, B. and Felt, L. (eds.), *Finding our Sea Legs: Linking Fishery People and Their Knowledge with Science and Management*. Newfoundland: ISER Books.

Parajuli, P. (2001) "Learning from ecological ethnicities: Towards plural political ecology of knowledge" in Grim, J. A. '*Indigenous Traditions and Ecology: The Interbeing of cosmological and community*' Cambridge, Harvard University Press/Centre for the Study of World Religions: 559-589

Paterson, B. Isaacs, M. Hara, M. Jarre, A. Moloney, C. 2010. "Transdisciplinary co-operation for an Ecosystem Approach to Fisheries: a case from the South African sardine fishery." *Marine Policy* 2010

Paulson, S. & Gezon, L. (eds) (2005) *Political Ecology across Spaces, Scales and Social Groups*. New Brunswick, Rutgers University Press

Povinelli, E. 2001. "Radical Worlds: The Anthropology of Incommensurability and Inconceivability." *The Annual Review of Anthropology* 30: 319-334

Rival, L. 2009. "The Resilience of Indigenous Intelligence." in Hastrup, K. (ed) 2009. *The Question of Resilience: Social Responses to Climate Change*. Copenhagen: The Royal Danish Academy of Sciences and Letters

Roepstorff, A. "The Double Interface of Environmental Knowledge".in Neis, B. & elt, L. (eds) 2000. *Finding Our Sea Legs: Linking Fishery People and Their Knowledge with Science and Management*. Newfoundland: ISER Books

Rogerson, J. M. 2009. ""Fish out of water": Fishers, the MLRA and ways of knowing the sea, Simonstown 2009." Unpublished Honours thesis. Department of Social Anthropology. University of Cape Town, South Africa

Rogerson, J. M. 2011. "Above the surface, beneath the waves: Contesting ecologies and generating knowledge contestations in Lamberts Bay." Unpublished M.A. thesis. Department of Social Anthropology, University of Cape Town, South Africa

Schultz, O. J. 2010. "Belonging on the West Coast: An Ethnography of St Helena Bay in the context of marine resource scarcity." Unpublished M.A. thesis. Department of Social Anthropology, University of Cape Town, South Arica

Serres, M. 2000. *The Birth of Physics*. Manchester: Clinamen Press Limited

Shannon, L. Jarre, A. Petersen, S. 2010. "Developing a science base for implementation of the Ecosystems Approach to Fisheries in South Africa." *Progress in Oceanography*. 87: 289-303.

Sowman, M. 2011. "New Perspectives in small-scale fisheries management: challenges and prospects for implementation in South Africa." *African Journal of Marine Science* 33(2): 297-311

Stanley, R and Rice, J. 2003. "Fishers' Knowledge? Why not add their scientific skills to the mix while you're at it?" *University of British Columbia Fisheries Centre, Proceedings: 'Putting Fishers' Knowledge to Work' 2003*.

Starfield, A. M. and Jarre, A. 2011. "Interdisciplinary Modelling for an Ecosystem Approach to Management in Marine Social-Ecological Systems." in Ommer and Team(eds) *World Fisheries: A Social-Ecological Analysis*. West Sussex: Wiley-Blackwell

Stead, S. Daw, T. and Grey. T. 2006. "Uses of Fishers' Knowledge in Fisheries Management." *Anthropology in Action* 13(3): 77-86

Stengers, I. 2005. "The cosmopolitical proposal." in Latour, B. and Weibel, P. (eds) *Making things public*. Massachusetts: Massachusetts Institute of Technology.

Stengers, I. 2008." Experimenting with Refrains: Subjectivity and the Challenge of Escaping Modern Dualism." *Subjectivity* 22: 38-59

Steyn, H. 1996. *Still Bay*. Still Bay: Still Bay Municipality

Stoffberg, D. 1998. "Still Bay's Stone Age Past", Guide No. 4: Stilbaai: Stilbaai-bewaringstrust

St. Martin, K. and Hall-Arber, M. 2006. "Charting Fishing Communities At Sea: Revealing New Potentials for Participation in Fisheries Science and Management." Paper presented at ICES 2006 *Fishing in the 21st Century*, Boston MA, 30th October – 3rd November.

Strathern, M. 2004 (1991). *Partial Connections*. California: Alta Mira Press

Sutton Lutz, J. and Neis, B. 2008. *Making and Moving Knowledge, Interdisciplinary and Community-based Research in a World on the Edge.* Quebec: McGill-Queen's University press.

Turnbull, D. 2000. *Masons, Tricksters and Cartographers*. Oxford: Routledge

Turnbull, D. 2004. "Performative and Propositional Knowledges: Niche Construction, Contingency, Emergence, Multiplicity and the Implications for Reconceiving 'Knowledge'," presented at the joint 4S/EASST Conference, Paris, France, August 25th – 28th 2004

Turnbull, D. 2009. Introduction: Futures for Indigenous Knowledges in *Futures: Special Issue on The Futures of Indigenous Knowledges.* Guest Editor David Turnbull. 41(1): 1-5

United Nations Food and Agriculture Organisation (FAO). 1998. *Status of Marine Fisheres.* Rome: FAO press

van Sittert, L. 2002. ""Those who cannot remember the past are condemned to repeat it": comparing fisheries reforms in South Africa." *Marine Policy* 4: 295-305.

van Sittert, L. 2003. "The tyranny of the past: why local histories matter in the South African fisheries.*" Marine and Coastal Management* 46. 199-219.

van Sitter, L. 2010 forthcoming. The End of Uncertainty: J. P. A. Lochner's Electrical Analogy Model of the Namibian Pilchard Stock 1967-1972.

van Zyl, M. 2008. "Heritage and Change: The implementation of fishing policy in Kassiesbaai, South Africa 2007." Unpublished M.A. thesis. Department of Social Anthropology, University of Cape Town, South Africa

Verran, H. 2001. *Science and an African logic.* Chicago: Chicago University Press.

Verran, H. 2011 forthcoming "Enactments between Disparate Knowledge Traditions: Toward Doing Difference Generatively and in Good Faith." paper presented as part of Contested Ecologies: Natures and Democracies in the Global South, Franschoek, South Africa, 16th September 2011.

Viveiros de Castro, E. (1998) "Cosmological Deixis and Amerindian Perspectivism." *Journal of the Royal Anthropological Institute* 4(3): 469-488

Viveiros de Castro, E. 2004. "Exchanging Perspectives: The Transformation of Objects into Subjects in Amerindian Ontologies." In *Common Knowledge* 10(3): 463-484

von Uexküll, J. 2010 (1934). *A Foray Into the Worlds of Animals and Humans: with a Theory of Meaning*. Minnesota: University of Minnesota Press

Whatmore, S. J. 2009. "Mapping knowledge controversies: Science, democracy and the redistribution of expertise." *Progress in Human Geography* (2009) pp. 1-12

Willerslev, R. 2004. "Not Animal, Not Not-Animal: Hunting, Imitation and Empathetic Knowledge Among Siberian Yukaghirs." *Journal of the Royal Anthropological Institute* 10: 629-652

Wilson, D. Raakjaer, J. Dengbol, P. 2006. "Local ecological knowledge and practical fisheries management in the propics: A policy brief." *Marine Policy* 30: 794-801

Wroblewski, J. 2000. "The Colour of Cod: Fishers and Scientists Identify a Local Cod Stock in Gilbert Bay, Southern Labrador." in Neis, B & Felt, L. F. (eds) 2000.*Finding Our Sea Legs*: *Linking Fishery People and Their Knowledge with Science and Management*. Newfoundland: ISER Books